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COMMONWEALTH OIL AND REFINING COMPANY PHASE I: SUBSURFACE OIL INVESTIGATION REPORT

Commonwealth Oil Refining Company
Petrochemical Complex
Penuelas, Puerto Rico 00731

DSM Project No. 1012-01-01

November, 1994

Prepared by:
DSM Environmental Services, Inc.
1830 South Kirkwood, Suite 201-A
Houston, Texas 77077

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I. EXECUTIVE SUMMARY

I. EXECUTIVE SUMMARY

This report has been prepared for Commonwealth Oil Refining Company (CORCO) by DSM Environmental Services, Inc. (DSM) for the Phase I: Subsurface Oil Investigation at the CORCO Petrochemical Complex, Penuelas, Puerto Rico (the Site). The Environmental Protection Agency Solid Waste Registration Number for the CORCO Penuelas, Puerto Rico Facility is **EPA SW ID# PRD-091017228**.

The Phase I: Subsurface Oil Investigation involved drilling thirty-two (32) soil borings fifteen feet into the uppermost aquifer at the site, the installation of thirty-two (32) piezometers and fluid level measurements at the CORCO Facility. Soil samples were collected and submitted to Analytical Laboratory for geotechnical characterization. Light-Non-Aqueous Phase Liquids (LNAPL) oil samples were collected and submitted to a Petroleum Laboratory for product characterization.

This report presents findings from the Soil Boring Program, Fluid Level Measurement Program, descriptions of approaches and procedures utilized in the performance of the subject soil sampling, and groundwater and product characterization at the CORCO Facility.

DSM completed piezometer well installation, oil sampling and groundwater level measurements to determine the possible extent of hydrocarbon impact on the uppermost water bearing zone beneath the site.

The boring locations of the Phase I: Subsurface Oil Investigation were based on the site specific lithology as determined by previous subsurface investigations conducted at the CORCO Facility. Previous investigations in these areas were conducted by Versar, Inc. (1986), Roy F. Weston, Inc. (1989), and GDC Engineering, Inc. (1994). The two formations investigated are as follows:

- Alluvial Deposits
- Ponce Limestone

The Phase I: Subsurface Oil Investigation stems from the 1990 Settlement Agreement between the U.S. EPA and Commonwealth Oil Refining Company. The purpose for the location and placement of soil boring/piezometer wells was to develop a Facility wide information base to determine the presence of free-phase product.

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II. TEXT

1.0 INTRODUCTION

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This report was prepared by DSM Environmental Services, Inc. for the Commonwealth Oil Refining Company Refinery/Terminal Facility (**EPA SW ID# PRD-091017228**), located at the Petrochemical Complex, Penuelas, Puerto Rico (United States of America Commonwealth).

The subsurface investigative work conducted at the site is in compliance with the 1990 Agreement between CORCO and the Environmental Protection Agency (U.S. EPA) Region II. A request from the U.S. EPA, Region II on January 28, 1994 initiated the Phase I: Subsurface Oil Investigation Work Plan (Weston 1990).

In order to characterize conditions at the site, several stages of field activity, laboratory analysis and data evaluation were initiated during the Phase I: Subsurface Oil Investigation. This report presents the data collected in the performance of: soil boring/soil sampling, piezometer well installation, oil sampling, and liquid level measurement programs.

The overall objectives of the on-going Phase I: Subsurface Oil Investigation are:

- to perform field investigation and laboratory tests to ascertain the physical surface and subsurface features;
- to determine the possible presence of free-phase hydrocarbons within the soils and uppermost aquifer and, if found, to evaluate the magnitude and extent thereof;
- to identify and evaluate the factors controlling the transport of hydrocarbons; and
- to identify the appropriate general post-assessment response measures for the site.

Earlier site assessment work discovered the existence of free-phase product on the water table within the fractured matrix of the Ponce Limestone. A previous investigation within the northwest portion of the facility, conducted by Roy F. Weston, Inc. (1989), encountered free-phase product during an Environmental Impact Statement investigation. The study was conducted at the proposed Modular Incineration Systems, Inc. site (MIS) Area, which is located due north of Tank 965 and Tank 956.

As part of the Environmental Impact Statement prepared for the proposed MIS Facility, six (6) bedrock monitoring wells were installed. During the drilling of these wells, hydrocarbon stained soils and odors were reported. In monitoring well MW-3, free-phase product was noted at a depth of one hundred and seventy five feet below land surface (175 ft. bls), at the approximate location of the water table. A strong hydrocarbon with black or brown free-phase product floating on the water was noted in the log for monitor well MW-4. In monitor well MW-5, a hydrocarbon odor was noted but no visible hydrocarbon was detected. Strong hydrocarbon odor was reported in monitor well MW-6. No hydrocarbon odor or product was reported in MW-1 or MW-2. The presence of free-phase product was confirmed and reported to the appropriate regulatory agency. US EPA correspondence of January 28, 1994 requested recovery of product confirmed at the MIS Area monitoring wells.

The Phase I: Subsurface Oil Investigation was initiated in May 1994 to determine the presence and volume of free-phase product at the CORCO Facility. Free-phase product was indicated at a number of wells during the installation of the thirty-two piezometers.

The Phase I piezometer wells, MIS Area monitoring wells and the RCRA monitoring wells were measured for static water levels and free-phase product levels on September 27, 1994. The product volume was calculated for all areas of free-phase product at the CORCO Facility. The series of calculations resulted in approximate volumes of free-phase product in five areas of free-phase product at the facility. The estimated volume of free-phase product, in the five areas, at the CORCO Facility are as follows:

The MIS Area contains 83,551 barrels of free-phase product;
The Tank Farm West Area contains 311,694 barrels of free-phase product;
The Facility South Area contains 26,481 barrels of free-phase product;
The Tank Farm Central Area contains 379,865 barrels of free-phase product; and
The Process Area contains 577,759 barrels of free-phase product.

The total estimated volume of free-phase product, at the CORCO Facility, is 1,379,351 barrels of free-phase product.

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A. DESCRIPTION OF RELEASE AND ABATEMENT MEASURES

The on-going subsurface investigatory activities are generating data that will be used in the evaluation of remedial alternatives as part of on-going corrective measures at the site. The Phase I: Subsurface Oil Investigation activities generated data necessary for the location, design, and feasibility of appropriate oil recovery systems. The on-going investigative activities will define the field activities required for final design parameters for oil recovery at the site.

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1.0 Site Description

The CORCO Refinery/Terminal is located in the south-central coast of Puerto Rico (see **Figure 1, Site Location Map**). Further definition of the site location is as follows:

- The property consists of a hydrocarbon products storage facility and terminal which occupies approximately eight hundred acres of land straddling the boundary between Municipio de Guayanilla to the west and Municipio de Penuelas to the east. The facility has a topographic relief of approximately 330 feet. Two-thirds of the facility is situated in the Lower Tallaboa Valley, which has an elevation range of 0 to 26 feet above sea level. One-third of the facility is situated on the southeastern edge of the upland ridge that separates the Guayanilla and Tallaboa River Valleys.

The south central coast is the most arid region of the Island. The hills and ridges are typically steep, with low-lying river valleys running southward from the Cordillera Central to the Caribbean Sea. Development is typically restricted to the coastal alluvial fans, coastal plains, plateaus, and inland river valleys.

The land adjacent to the terminal is used for industrial, small business, and residential purposes. Cottage industries are practiced at some of the residential areas. The industrial activities immediately adjacent to the CORCO Site are carried on to the east, south, and west. The site is bounded by Puerto Rico Route 2 to the north, Gulfchem and Caribe Isoprene Corporation to the east, Puerto Rico Electrical Power Authority (PREPA) and Shell Company to the west, and Union Carbide to the south. The Union Carbide Facility separates the Eastern and Western Lagoon Areas (see **Figure 2**, Site Facility Map).

A number of the industries in the petrochemical complex area have discontinued petrochemical and refining operations. PREPA continues to operate as an electrical generating station.

2.0 Site Facilities

The CORCO Facility was formed in 1953 and operated as an independent petroleum refiner and petrochemical manufacturer in the Commonwealth of Puerto Rico. CORCO Facility historically operated as a petroleum refining and petrochemical manufacturing plant. All petrochemical operations were suspended in November 1981 and all refining operations ceased in March 1982. CORCO continues to operate part of its facilities as a products storage facility and terminal. At present, CORCO is leasing tank storage to other companies for product storage.

When in complete operation, the CORCO complex was divided into several units or areas (Versar, 1986). These units included:

- Refinery Unit No. 1
- Refinery Unit No. 2
- Refinery Unit No. 3
- Petrochemical Unit No. 1
- Petrochemical Unit No. 2
- Caribe Isoprene Corporation (CIC)
- OXOCHEM Enterprises, Inc.
- Olefins Plant
- HERCOR Chemical Plant
- Docking Areas

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During production, each refinery operated two crude oil distillation units, a vacuum distillation unit for crude bottoms, a Hydryflow catalytic cracker unit, a Visbreaker unit, a hydrotreater unit, a catalytic polymerization unit, and a sulphur recover unit (GCA, 1985). Products of the refinery included gasoline, naphtha distillates, wet gases, propane, butane, and fuel oil. At present time, all production operations are idle.

The petrochemical plants (CPI No. 1 and CPI No. 2) received part of their feed stock from the refinery complex. These feedstocks, heavy and light naphthas, coupled with purchased naphtha were used to produce liquified petroleum gas (LPG), butane, cyclohexane, benzene, toluene, and mixed xylenes (ortho-xylenes, meta-xylenes, and paraxylenes). The petrochemical complex ceased operations in November of 1981. In 1987, both plants were sold to Arochem International.

The acid plant produced sulfuric acid that was used as a catalyst in the alkylation unit. Sulfuric acid was also sold as a product. The raw material for the plant was spent sulfuric acid from the alkylation unit and recovered hydrogen sulfide from the refinery process. The acid plant ceased operations when the refinery ceased operations.

Caribe Isoprene Corporation (CIC) was a joint venture with Mitsubishi and Nippon Zeon Corporations to produce isoprene, which is used in rubber production. CIC ceased operations in 1982. CORCO currently owns the CIC property.

The OXOCHEM Plant produced oxo-alcohols. The raw material (propylene) for this plant was obtained from both the Olefins Plant and CORCO. Final products included 2-ethylhexanol, isobutanol, and butanol. The alcohols were used as raw materials for phthalate plasticizers. The plant was a joint venture with GRACE Corporation. The plant was closed in 1978.

The Olefins Plant was a joint venture with PPG Company. The plant produced propylene for the OXOCHEM Facility. The Olefins Plant closed in 1978. CORCO does not own the property occupied by the Olefins Facility. However, CORCO owns two tanks and ancillary facilities, including real estate, that were originally owned and operated by Puerto Rico Olefins (PRO).

The HERCOR Chemical Plant was jointly owned by CORCO and Hercules Chemical Corporation until 1981. In 1981, CORCO withdrew from the HERCOR operations and the chemical plant became the property of HERCOR Chemical. The plant received feedstock from the petrochemical complex and produced paraxylenes. CORCO does not own the property occupied by the HERCOR Chemical Plant.

CORCO has operated docking facilities on Tallaboa Bay and Gauyanilla Bay. The Tallaboa dock was leased from the Puerto Rico Port Authority and is not longer under the lease agreement, but is still utilized by CORCO. The Guayanilla Bay dock, which is owned by CORCO, was used for the loading and unloading of refinery, petrochemical, and propylene products. The dock is still used for the loading/unloading of diesel, LPG, jet fuel, and gasoline.

A separate business consortium proposed to build a modular incineration system at the CORCO Facility. The construction site was prepared in the northwest portion of the CORCO Facility on the hillside above the refinery. The site was leveled by cutting into the hillside and back-filling along the margins. The modular incineration system was not constructed.

The CORCO Tank Farm is for the storage of hydrocarbon products. The largest portion of the Tank Farm is located north of Route 127 and is situated on the Ponce Limestone. A number of tanks (8) are located to the south of Route 127 on the Quaternary Alluvium. The tanks north of Route 127 on the Ponce Limestone, have been cut into the hillside and back filled with caliche along the margins. The elevation of the Tank Farm, north of Route 127, ranges from 35 to 330 feet above msl. The elevation of the Tank Farm, south of Route 127, ranges from 8 to 20 feet above msl.

3.0 Description of Release

Earlier site assessment work discovered the existence of free-phase product on the water table within the fractured matrix of the Ponce Limestone. A previous investigation within the northwest portion of the facility, conducted by Roy F. Weston, Inc. (1989), encountered free-phase product during an Environmental Impact Statement investigation. The study was conducted at the proposed Modular Incineration Systems, Inc. site (MIS) Area, which is located due north of Tank 965 and Tank 956.

As part of the Environmental Impact Statement prepared for the proposed MIS Facility, six (6) bedrock monitoring wells were installed. During the drilling of these wells, hydrocarbon stained soils and odors were reported. In monitoring well MW-3, free-phase product was noted at a depth of one hundred and seventy five feet below land surface (175 ft. bls), at the approximate location of the water table. A strong hydrocarbon with black or brown free-phase product floating on the water was noted in the log for monitor well MW-4. In monitor well MW-5, a hydrocarbon odor was noted but no visible hydrocarbon was detected. Strong hydrocarbon odor was reported in monitor well MW-6. No hydrocarbon odor or product was reported in MW-1 or MW-2. The presence of free-phase product was confirmed and reported to the appropriate regulatory agency. US EPA correspondence of January 28, 1994 requested recovery of product confirmed at the MIS Area monitoring wells.

During a site visit in March of 1994, free-phase product levels were measured in the monitoring wells at the MIS area. The results of these measurements are presented in **Table 1**. Four (4) of the six (6) MIS monitoring wells contained significant thickness of free-phase product. Monitoring wells MW-1 and MW-2 contained no product. The measured static water levels, in MW-1 and MW-2, showed that the water levels were above the screened interval and free-phase product floating on the water table could not enter these wells. The measured thickness of free-phase product, March of 1994, ranges from 6.74 to 9.30 feet in monitoring wells MW-3 through MW-6.

4.0 Abatement Measures

CORCO submitted, on April 15, 1994, "Product Recovery Work Plan for the M.I.S. Area, COMMONWEALTH OIL REFINING COMPANY, INC." to the US EPA, Region 2. The product recovery work plan was approved and initiated in July, 1994. The product recovery system consists of four (4) product recovery pumps installed in the MIS Area monitoring wells where the presence of free-phase product has been confirmed. The product recovery pumps will be installed in MW-03, MW-04, MW-05, and MW-06, which have a significant level of confirmed free-phase product. The MIS Area recovery system includes an air compressor, four (4) downhole pneumatic pumps, Water Production Prevention system, and an above ground storage/staging tank.

The downhole pneumatic pumps operate on a cyclic principle with the duration of the discharge and refill cycles determined by a Main Pump Controller. The cyclic discharge and recharge of the compressed air is the operating machinize that actuates product production from the pumps. The discharge occurs when a compressed air charge is delivered to the pump, which causes the air intake check balls to seat while simultaneously forcing collected product through the discharge tubing. The refill cycle occurs when the compressed air charge is removed, which allows the pump to refill with product. The pressurized air vents from the pump, through the discharge tubing, moving recovered product to the above ground storage/staging tank.

The pumps operate on cycles, which are controlled by a pneumatic timing circuit. The multiple pumps are operated from one Main Pump Control by use of Satellite Controls. A satellite control is placed at each well head, with two air line connections. One air line connection supplies "operating air" to the pump and the other air line connection is the "logic" tubing from the main control manifold. The rate and duration of the discharge and refill cycles are determined at the main control manifold. The "logic" signal, sent from the main control, actuates a valve on the satellite control and allows "operating air" to flow to the pump. Attached to the satellite control is a level sensing tubing that extends down the well to the liquid level. The "logic" signal from the main pump control is blocked until there is enough fluid in the well to submerse the end of the level sensing tubing. This prevents the operation of individual pumps in low product level conditions, without shutting down the recovery system.

The water production prevention systems include a Conductivity Control System and a Water-In-Oil sensor. The Conductivity Control System consists of a conductivity probe placed downhole, below the liquid intake level, of each operating pump. On detection of water, the Conductivity Control actuates a solenoid valve that blocks the "operating air" flow to the specific pump. This allows the recover system to continue operation, even if one or more pumps are down due to slow recovery. The second water production prevention system is an Water-In-Oil sensor. The sensor is located downstream of the product discharge manifold. When a product with a total concentration of 0.1% H_2O is detected, the controller sends a signal to the Air Solenoid Controller which blocks the air supply to the Main Pump Control. This shuts down the recovery system. The Water-In-Oil sensor is equipped with a latching relay that allows the system to be manually operated in an over-ride mode for pumping water contaminated oil to treatment or storage. The recovered product will be recycled, blended and stored for sale. All storage/staging tanks are equipped with high-level pump shut down devices to prevent possible overfill.

The product recovery system was expected to go on-line October 15, 1994. The recovery system start-up has been postponed due to possible lateral downhole movement of a clay formation. The pneumatic recovery pumps (1¾ x 56 inches) could not be correctly positioned at the proper depth below land surface, as the pumps bound inter-casing at 40 ft. bls. This depth approximates the location of a clay facie that is known to cause slump and mass wastage within the Ponce Limestone. The well casings has been scheduled, as of

October 14, 1994, to be tested using a inter-casing caliper to determine if pumps with a shorter length can be positioned correctly within the product. The pneumatic pump manufacture was notified and requested to engineer a smaller pump (1⅝ x 36 inches). These pumps will be constructed if the caliper testing indicates the wells are viable as recovery wells. At present, the recovery system is expected to be on-line in early November 1994.

B. SITE CHARACTERIZATION

1.0 Site Physiography

Puerto Rico is the most easterly and smallest of the four major islands that form the Greater Antilles. The other three land masses within the Greater Antilles island cluster include Cuba, Jamaica, and Hispaniola. Puerto Rico is surrounded by the Atlantic Ocean to the north and the Caribbean Sea to the south. The Islands most noteworthy geological feature is the Cordillera. A chain of towering mountains that rise above the Central Region. The mountain summits are the high parts of a chain that's mass is buried mostly beneath the sea. The mountain peaks are the result of volcanic actively that deposited lava and igneous rock in consecutive layers. To a lesser degree, the island is composed of quartz, diomites, and along some of the edges, coral limestone.

The daily temperatures in Puerto Rico average in the mid-70's and seldom go above 85 degrees or below 70 degrees. Most rain falls in May but there is no definite rainy season. The sun shines most days of the year. The CORCO Facility is located on the Caribbean Island of Puerto Rico. The facility is situated south of the Central Cordillera Mountains in the southwest region. The CORCO Facility is near Ponce, which is the second largest city in Puerto Rico.

2.0 Regional Geology and Hydrogeology

The CORCO Facility is located in the Tallaboa-Guayanilla-Guanica subarea of the south coast region of Puerto Rico (USGS, 1987). The three formations in the Tallaboa-Guayanilla-Guanica subarea are Quarternary Alluvium, and the Tertiary Limestones which are made up of the Ponce Limestone and Juana Diaz Limestone. Thick deposits of unconsolidated Quarternary Alluvial of boulders, gravel, sands, silts and clays underlie large portions of the Tallaboa Valley. These alternating alluvial sequences grade southward towards the Caribbean Sea to finer-grained deposits of lacustrine origin. The Quarternary lacustrine deposit composition is generally fine-grained sequences of sand, silts, clays and peat. Further southward towards the Caribbean Sea, the benthoic deposits are generally thin re-worked beach deposits of quartz sand and calcite reef rubble. The Quarternary deposits thicken seaward and are underlain by the Tertiary Limestone formations. The Quaternary

Alluvial Deposits are underlain by the Tertiary Ponce Limestone in the south and by the older Tertiary Juana Diaz Limestone to the north.

The Ponce Limestone is the bedrock of concern in the area of the CORCO Facility. The Ponce Limestone is comprised of an upper Miocene member and a lower Oligocene member with a total thickness of 2,260 feet. Tallaboa Valley Basin is underlain by the Ponce Limestone. Most of the Ponce Limestone is a yellowish-white chalky limestone. The Ponce Limestone is generally massive, but includes some thin dense strata and clay facies. The formation is commonly fossiliferous (USGS, 1972). The limestone strikes east-west and dips south at an angle of ten to twenty degrees. The Ponce Limestone at the CORCO Facility trends 86 to 94 degrees east and dips 18 to 22 degrees south.

The principle water bearing units underlying the study site are the unconsolidated Alluvial Deposits and the Ponce Limestone. Based on test borings, monitor well and piezometer installation programs, the Ponce Limestone is the aquifer of concern for the free-product recovery program.

The regional hydrogeology discussion is based primarily on the U.S. Geological Survey report on the water resources of the Tallaboa Valley by Grossman et. al. (1972). Unconsolidated deposits of sand and gravel, in the central portion of the valley, are by far the most productive water-bearing material in the Tallaboa Valley region. The Ponce Limestone may serve as a supplemental source of water to wells tapping the overlying sand and gravel. Wells in the Quarternary Alluvial have the highest specific capacity and yield. The maximum yield is reported at 1,200 gpm (USGS, 1972). The average yield of forty nine (49) wells tapping the sand and gravel aquifer is about 260 gallons per minute (gpm), with individual wells yielding upwards to 1,650 gpm. In spite of the low yield and a wide range in chemical quality of groundwater, the Ponce Limestone is the only productive bedrock in the area and is second only to the unconsolidated sand and gravel as a source of water. The average yield of four wells tapping this rock is 30 gpm, the maximum yield being 100 gpm. Salt water intrusion in the alluvium is common near the sea and inland in heavily pumped supply wells. The Beach and dune deposits commonly contain salt water.

Saltwater intrusion from the sea was reported as early as 1961 to be affecting wells south of Route 127. Further studies by the USGS in 1966 showed many wells in this area reporting increased chloride concentrations, the predominant anion of sea water (USGS, 1972). The fresh water supplies for potable and industrial use are obtained from well fields owned and operated by the industries or by the Puerto Rico Aqueduct Authority. The Puerto Rico Aqueduct Authority public potable water is partially supplied from the Grazas Dam, the Yauco Reservoir, and a well field. The well field is located north of Highway 2, in the north Tallaboa Valley, and is completed in the alluvial gravel and sand aquifer. Saltwater intrusion, has shut down most potable water wells in the Tallaboa Valley Region south of Route 127.

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Groundwater exists under water table conditions within the alluvial deposits and in the upper part of the Ponce Limestone beneath the valleys (Weston, 1992). The groundwater of the Tallaboa Valley Alluvial deposits occurs under water table conditions with a gradient to the south towards the Bahia de Tallaboa. Groundwater recharge is due to infiltration/percolation. The fractured limestone recharges from the alluvial sands and gravel in the central valley region. The upland region is not favorable to recharge as the limestone is more competent with fewer joints and fractures. The yields in the upland regions of the Ponce Limestone is generally low with high concentrations of dissolved solids. The Juana Diaz Formation may supply small yields of water in the valley, but is of poor chemical quality with a high content of chloride and sulfate (USGS, 1972).

3.0 Potential Receptors

The potential migration pathways investigated are subsurface soil and groundwater. The focus of this section shall deal with these avenues of potential migration.

Groundwater in the vicinity of the CORCO Facility occurs under water table conditions. The groundwater flow direction is towards Guayanilla Bay and Tallaboa Bay. This is a south to southwest flow direction.

The groundwater flow direction in the vicinity of the Eastern lagoon Area is to the southeast and towards Tallaboa Bay. The Tallaboa River, located approximately 1,200 feet to the west of the Eastern Lagoon Area, is likely to have little or no effect on the groundwater flow direction in the area of the Eastern Lagoon Area.

Route 127 appears to act as a possible hydraulic barrier (Ref. Lithology Section) at the CORCO Facility. The water table appears to mound up adjacent to the roadway. This phenomenon needs to be further investigated during subsequent product level measurement events.

The background water quality has been assessed in the northwest portion of the CORCO Facility at the MIS Area. The water quality was assessed during the MIS Environmental Impact Statement (Weston, 1989). Based on laboratory analysis of the MIS Area groundwater samples, the groundwater is considered to be of poor quality for both drinking water and industrial usage. Chloride concentrations, in all MIS Area wells (MW-1 through MW-6), were above the Federal drinking water standards of 250 mg/ℓ. The chloride concentrations ranges from 523 mg/ℓ in MW-1 to 2,820 mg/ℓ in MW-4.

C. SOIL ASSESSMENT

1.0 Soil Boring Program

The soil boring locations at the CORCO Facility were based on probable avenues of migration. In this way, a suitable number of soil borings serve to characterize potential pathways for contamination migration, the magnitude of contamination within the soil matrix, and the aerial extent of free-phase product on the water table. Additionally the soil boring investigation assess possible migration pathways that may exist between the Ponce Limestone and the alluvial deposits. The Phase I: Subsurface Oil Investigation soil borings were converted into piezometer wells to aid in determining the extent of free-phase product and possible migration pathways.

Before drilling activities began, the location of all soil borings/piezometer wells were staked by the on-site DSM geologist. The locations were approved by a CORCO representative for CORCO utilities, to ensure that underground pipelines, underground cables, water pipes or other potentially dangerous features were not encountered.

A total of five (5) soil borings/piezometer wells were moved from the proposed locations as delineated in the Phase I: Subsurface Oil Investigation Work Plan (WESTON, 8/30/90). Boring locations were adjusted based on site access, property boundaries, and surface obstructions. The soil borings/piezometer wells were relocated as per verbal directive from Mr. Tim Gordon during a May 11, 1994 Site visit (refer to **Figure 3, Soil Boring Location Map**).

The authorized relocated soil borings/piezometer wells are as follows:

- PD-1, PD-2 Equally spaced on the Causeway to CORCO Docks flanking Tank 1007;
- PD-18 West of the CORCO Laboratory at the extent of CORCO property;
- PD-22 North West corner of CPI-1, due North of Tank 739; and
- PD-26 North of the Refinery Plant II, due North of the boiler office.

The bore-holes were advanced using a Hollow-Stem Auger Drilling Rig. The soil borings were installed using a trailer mounted Acker and CME-55 drilling rigs capable of advancing a 6.25-inch outside diameter (O.D.) hollow stem auger to a predetermined depth as defined in the Soil Boring Plan. Soil borings were sampled from the ground surface to a termination depth (TD) approximately fifteen (15) feet below the water table using a split-spoon sampler. Split-spoon samples were collected at 5-foot intervals or at smaller intervals during changes in subsurface lithology or when a water horizon was encountered. This drilling methodology was used for all 32 soil borings in both the Alluvial Deposits and the Ponce Limestone.

A 2-foot split-spoon sampler was utilized because poor sample recovery was encountered when drilling in both the alluvial Deposits and the Ponce Limestone. Poor sample recovery occurred in facies of course-grained and/or saturated granular sediments and in zones of high density - hard to compact bedrock. Standard penetration tests were preformed when using the split-spoon sampler in the course-grained, noncohesive, and saturated granular sediments in conformance with ASTM D-1586. This in-field physical properties testing technique was used to quantify the relative density of the noncohesive and cohesive facies.

The sampling tools utilized in the investigation were decontaminated between collection of individual samples. All downhole equipment and the drilling rig was decontaminated prior to initiating the drilling of a soil boring. The sampling tools, drill rig, and downhole equipment were decontaminated using a high-pressure, hot water steam cleaner and a high-pressure potable water rinse. Those items for steam cleaning would include drill pipe, hollow-stem auger flights, drill bits, tremie pipe, and down hole sampling devices.

At the soil boring site, the sampling equipment was decontaminated between samples using first a washing and scrubbing in a mild laboratory detergent (Liquinox ©), followed by a potable water rinse, and then a final rinse using deionized water. The on-site decontamination procedures were used on sampling devices such as split spoons, Shelby tubes, as well as sample trays and stain-less steel trowels and knives.

1.1 Soil Boring Location

The boring locations of the Phase I: Subsurface Oil Investigation were based on the site specific lithology as determined by previous subsurface investigations conducted at the CORCO Facility. Previous investigations in these areas were conducted by Versar, Inc. (1986), Roy F. Weston, Inc. (1989), and GDC Engineering, Inc. (1994). The two formations investigated are as follows:

- Alluvial Deposits
- Ponce Limestone

The Phase I: Subsurface Oil Investigation is in complience with the 1990 Settlement Agreement between CORCO and the U.S. EPA. The purpose for the location and placement of soil boring/piezometer wells was to develop a facility wide information data base to determine the presence of free-phase product.

Eight (8) soil borings were drilled in the Alluvial deposits between the Eastern Lagoon Area and the Western Lagoon Area at CORCO's southern property boundary. Eight monitoring wells (EL-1 through EL-4 and WL-1 through WL-4) had been drilled by GDC Engineering, Inc. (1994) in a previous investigation in the Alluvial Deposits.

The eight soil borings drilled in the Alluvial deposits are located south of Route 127. The soil boring PD-1 is situated at the northwest corner of Tank 1007's berm. The remaining seven (7) soil borings in the Alluvial Deposits, PD-2 through PD-8, are located on a west to east line approximately equal-distance between each other. The borings PD-3 through PD-8 are located at the southern extent of CORCO property.

Twenty-six (26) soil borings were drilled in the Ponce Limestone. These borings were placed in three strings on an west to east orientation to the extent of CORCO property. The strings were placed within three approximate ranges of elevations at 40 to 55 msl, 90 to 105 msl, and 145 to 190 msl. A previous investigation within the northwest portion of the facility, conducted by Roy F. Weston, Inc. (1989), encountered free-phase product during an Environmental Impact Study. This study was conducted at the proposed Modular Incineration Systems, Inc. site (M.I.S. Area), which is located due north of Tank 965 and Tank 956. The elevations of the MIS Area monitoring wells ranges from approximately 170 ft. bls to greater than 200 ft. bls.

The twenty-six (26) soil borings drilled in the Ponce Limestone are located north of Route 127. The lowest string of soil borings, PD-9 through PD-18, are located south of the process areas at two elevation ranges of approximately 45 to 55 ft. msl and 90 to 105 ft. msl. These borings are spaced equal-distance, on an west to east bearing, from southwest of Tank 1011 to due east of PROLAB. The second string of soil borings, PD-23, PD-24, PD-19, PD-20, PD-21, PD-27, PD-28, PD-29, and PD-22, are located on the roadway north of the process areas. The second string of borings is at two elevation ranges of approximately 90 to 105 ft. msl and 145 to 190 ft. msl. These borings are spaced equal-distance, on a west to east bearing, from due west of Tank 965 to due north of C.P.I. 1. The third string of soil borings, PD-30, PD-31, PD-32, PD-25, and PD-26, at two elevation ranges of approximately 90 to 105 ft. msl and 145 to 190 ft. msl. These borings are spaced equal-distance, on a west to east bearing, from due west of Tank 955 to south east of Tank 973. The third string of soil borings is located south of the MIS Area.

All thirty two (32) soil borings/piezometer well installations were advanced to the uppermost aquifer. The soil borings were terminated a minimum of 15 feet into the water table. Occasionally the boring was drilled further into the formation when a "heaving sand" was encountered. The additional footage drilled was deemed necessary inorder to set a piezometer well without impacting the formation. The soil borings were expected to encounter the saturated zone between 5 to 15 feet above mean sea level (msl) in both formations as the uppermost aquifer at the facility is acting under water table conditions.

1.2 Sample Selection

Soil samples were collected in advance of the hollow stem drilling augers with a split-spoon sampler to ensure that the samples were collected from undisturbed soils. When a soil sample had been collected, it was brought to the surface and removed from the downhole split-spoon sampler. The soil samples were collected from the cores using dedicated or decontaminated sampling tools at regular 5 foot depth intervals. If sandy unconsolidated, noncohesive samples were retrieved, the sample was carefully scooped into glass sample containers using a stainless steel spoon. The collected soil core and bedrock samples were placed into glass sample containers for delivery for analytical laboratory analyses.

All collected soil samples were logged in the field by a qualified DSM professional in geology. Selected sample intervals were tested and described in the field using the Unified Soil Classification System (USCS). DSM drilling logs and field records include discussions of the lithographic characteristics encountered according to the USCS descriptive methodology (refer to **Figure 4**). The USCS soil description defines the soil types within a specific format describing structure, texture, mineral composition, moisture content, color and name. The USCS soil description also notes any evidence or odors indicating hydrocarbon contamination.

A portion of each collected sample was placed in a sample screening container and the head space scanned with an Organic Vapor Analyzer (OVA). The make and model of the OVA used during the investigation was a Microtip HL-2000 Photovac ©. The OVA was calibrated, at a minimum of once a day, with a span gas of 100 parts per million (ppm) isobuytlene for the detection of light end hydrocarbons.

Field screening of boring samples for volatile organics was performed by taking a representative sample from the full length of each core sample and sealing it in an air tight plastic bag of approximately 500 ml capacity. After the sample had been allowed to equilibrate for at least 5 minutes, the bag was pierced with the probe of an OVA. The headspace gas was allowed to enter the photoionization detector of the OVA to obtain a reading of the maximum volatile organic constituents. The soil classification and vapor analyses record of the detected hydrocarbon result was recorded on the Field Boring Log. The OVA results from the soil borings was recorded as parts per million (ppm) and at the representative depth below-land-surface (bls) the sample was retrieved.

The Field Boring Logs were reviewed following completion of the Phase I: Subsurface Oil Investigation. The Field Boring Logs contained: piezometer completion data, sample number, sample depth, blow-counts, percent recovery, USCS sample description, and sample type. A total of five hundred and fifty (550) samples were collected during the investigation. All samples were submitted to an analytical laboratory for visual-manual description and USCS classification.

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1.3 Soil Boring Geotechnical Results

The five hundred and fifty (550) soil samples collected during the investigation were reviewed with respect to both the Phase I: Subsurface Oil Investigation, and the M.I.S. Area Product Recovery Project. All five hundred and fifty (550) collected soil samples were analyzed by a Geotechnical Laboratory for Visual-Manual Description, and USCS Classification. A group of two-hundred and seventy (270) soil samples were selected to be analyzed for Grain Size, Plasticity Index and Moisture Content. These samples were selected for laboratory analysis based on the need to gather facility wide geo-technical data for free-phase product recovery. This information was judged to be essential for a cognizance understanding of the subsurface conditions at the facility.

The two hundred and seventy (270) collected soil samples have been categorized by piezometer number, sample number, and the depth below-ground-surface for the samples to be analyzed for Grain Size, Plasticity Index and Moisture Content (refer to **Table 2, Collected Soil Samples Sent to an Analytical Laboratory**).

The collected soil samples were sent to an analytical laboratory for analysis of Grain Size, Plasticity Index and Moisture Content to obtain: 1) independent non-bias conformation of the facies; 2) in-situ physical characterization; and 3) analytical laboratory characterization. The Field Boring Logs indicated that the Ponce Limestone and the Alluvial Deposits formations are heterogeneous.

The samples analyzed were selected from facies encountered in the Phase I: Subsurface Oil Investigation that may influence product transportation, product migration, and product recovery. The facies that are greater than twenty (20) feet thick had multiple samples analyzed inorder to get a analytical range across the facie. The facies were determined in the field by visual-manual classification methods. The field description indicated that the formations are heterogeneous. The categorized samples were then sent to an analytical laboratory for laboratory characterization.

The characterization of the soil samples will aid in optimizing product recovery at the CORCO Facility. The analytical data will be used to model the subsurface in order to determine optimal recovery methods and time necessary to recover the product on the water table.

A measurement of particle size distribution has been made for the facies analyzed by the laboratory. The methodology for measurement of particle size distribution was a sieve/hydrometer analysis according to ASTM 63D422 (rev. 1990). The particle size gives an estimate of the hydraulic conductivity of the soil and an assessment of the sorptive capacity of the soil.

The laboratory Atterburg Test (ASTM D4318 rev. 1993) was completed on the samples. These test results will aid in optimizing free-phase product recovery at the facility.

Atterburg Tests have been preformed on facies in the Ponce Limestone. The plasticity and type of fine-grained soil is identified by placement on the Plasticity Chart.

Field estimation of plasticity was accomplished by the repeated act of deforming and remolding a small lump of soil. The methods of performing the field plasticity evaluation was the worm-test. In the worm-test, a small lump of the soil (approximately 0.5 inches by 0.5 inches) was removed from the core. The lump of soil was first saturated (water was added if not naturally saturated), then rolled back and forth between the palms and hand until a "worm" of approximately 1/8 inch in diameter was formed. The sample was determined to be at its plastic limit when the worm breaks upon being rolled. The sample was then remolded into a lump, and the process (without adding additional water) was repeated. The field plasticity description was based upon the number of times the process can be repeated as follows:

Field Plasticity Determination (Worm Test)

Nonplastic	1/8 inch worm cannot be rolled at any water content.
Low Plasticity	1/8 inch worm can barely be rolled and lump cannot be formed after reaching plastic limit one time.
Moderate Plasticity	1/8 inch worm is easy to roll and form but lump cannot be formed after reaching plastic limit one to three times.
High Plasticity	1/8 inch worm can be rolled and reformed numerous times.

The moisture content of a soil was determined in the field by visual-manual methodology. The description is important in understanding an aquifers characteristics and possible reactions to recovery system stresses. Great care was taken when determining the point of saturation and the thickness of any capillary fringe. The moisture content was determined in the Atterburg Test (ASTM D4318) for the submitted soil samples.

Partially saturated soils were described as being dry, damp, or moist with increasing degrees of saturation. When a sample was seen to be saturated it was recorded on the Field Boring Logs at the depth the soil became saturated and of the depth at which the soil ceased to being saturated. The degree of saturation was determined in the field using the following visual methods:

Field Moisture Content Determination

Dry	Absence of moisture, dusty, dry to the touch.
Damp	Sufficient moisture to hold particles together but not sufficient to smear fines when rubbed.
Moist	Sufficient moisture to hold particles together and to smear fines when rubbed.
Saturated	Sample has free water. Visible water forms at sample surface when struck repeatedly with the flat edge of a sampling knife.

The relative density of a noncohesive soil or slightly cohesive soil was determined by recording an "N-value" from the hammer blows used to advance the split-spoon sampler. The split-spoon sample was collected by advancing an 18 inch long by 1 inch ID sampler with repeated 30 inch free-fall drops of a 140 pounds hammer. The sampler was placed on the bottom of the borehole, and six inch increments are marked off on the drill stem from a fixed referenced (the top of the augers). The hammer was then used to advance the sampler (as indicated above), and the number of blows required to drive each 6-inch interval were recorded on the Field Boring Logs. For the protection of the sample tool, no more than 50 blows are used during any single 6-inch advance.

1.4 Piezometer Well Installation

The Phase I: Subsurface Oil Investigation soil borings were converted into two-inch piezometer wells in order to monitor the uppermost aquifer at the CORCO Facility. The piezometer wells were completed in accordance with the US EPA approved Weston Phase I: Subsurface Oil Investigation Work Plan. The piezometer configuration was installed to determine the potentiometric surface at the CORCO Facility.

The drilling subcontractor mobilized to the CORCO Facility on May 10, 1994 and commenced drilling on May 12, 1994. The drilling rig mobilized to the site in May 1994 was an trailer mounted Acker capable of drilling 6 ⅜ inch OD Hollow Stem augers. A second drilling rig, a trailer mounted CME-55, was mobilized to the CORCO Facility on June 22, 1994. The installation of all thirty-two (32) piezometers was completed on July 22, 1994 (ref. **Table 3**). The construction of all thirty-two (32) piezometer pads was completed August 17, 1994.

The bore-holes were advanced using a Hollow-Stem Auger Drilling Rig. Split-spoon samples were collected at 5-foot intervals or at smaller intervals during changes in subsurface lithology or when a water horizon was encountered. This drilling methodology was used for all 32 soil borings in both the Alluvial Deposits and the Ponce Limestone. When the soil sampling and logging was complete, the bore hole was reamed to remove any material that may have slough off downhole. The hollow stem augers were then removed from the bore hole and the piezometer well was installed inter-bore. Each piezometer well was constructed of 2-inch, Schedule 40, flush threaded, PVC monitoring well casing. No joint compound was used to seal the PVC threads. The screen sections were 20 feet factory lengths of PVC "wire wrapped" slotted screen as approved in the Work Plan. The added strength of the PVC "wire wrapped" screen was determined to be necessary due to the downhole pressures. Five feet of screen was positioned above the saturated zone with the remaining fifteen feet of screen set below the water table.

At boring locations in the Quarternary Alluvial and the Ponce Limestone, a "heaving sand" was encountered. In such instances, the borehole was usually drilled an additional five (5) feet and a five foot section of blank casing added to the bottom of the screen. This allowed for formation collapse and "heaving sand" to occur while screening the proper zone and placing the filter pack from the bottom of the screen to a minimum of two feet above the screened interval.

Once the well screen and casing were positioned inside the borehole, a clean gravel filter pack was introduced into the annulus. The filter pack was brought up to a depth of approximately two feet above the screened interval. A weighted measuring tape was used to measure the settling depth of the well materials. Bentonite pellets were added to a minimum depth of two feet above the filter pack and then hydrated to form a seal. The remaining annulus was filled with dry cuttings, that had no visible oil staining or detectable hydrocarbon as measured with the OVA, from the vadose portion of the borehole to within two feet of ground surface.

The piezometer well completions consist of a locking six-inch protective well casings set into a four by four foot by six-inch sloped concrete pad. The well pads have four three-inch concrete filled steel protective casings placed eighteen inches in the ground at each corner of the well pad. The well casings were filled with concrete to a height of greater than twelve inches above natural ground surface. A flush mount surface cover was used in place of the steel protective well casing at PD-15 and PD-20. The surface mount cover was utilized inorder not to impede traffic in the roadway.

A piezometer well construction summary is submitted in **Appendix C - Soil Assessment.** The soil boring logs, interval screened, gravel pack interval, survey data, and analytical data is summarized on the piezometer well installation forms.

1.5 Decontamination Procedures

In order to eliminate the possibility of cross-contamination, special procedures were followed during the field investigation. The most effective procedure utilized was contamination avoidance. As much as possible, dedicated and/or disposable equipment were used to collect samples. Personnel coming in contact with samples used a level of personnel protection as indicated by the Site Specific Health and Safety Plan. Gloves were replaced each time a new sample was handled.

The sampling tools utilized in the investigation were decontaminated between collection of individual samples. All downhole equipment and the drilling rig was decontaminated prior to initiating the drilling of a soil boring. The sampling tools, drill rig, and downhole equipment was decontaminated using a high-pressure, hot water steam cleaner and a high-pressure potable water rinse. Those items for steam cleaning would include drill pipe, hollow-stem auger flights, drill bits, tremie pipe, and down hole sampling devices.

At the soil boring site, the sampling equipment was decontaminated between samples using first a washing and scrubbing in a mild laboratory detergent (Liqunox ©), followed by a potable water rinse, and then a final rinse using deionized water. The on-site decontamination procedures were used on sampling devices such as split spoons, Shelby tubes, as well as sample trays and stain-less steel trowels and knives. When in use or in storage, all uncontaminated equipment was protected from contamination by using plastic sheeting or some other appropriate method.

The down-hole equipment decontamination was performed near the API Separator. Care was taken to ensure that any overspray or runoff was collected, contained and labeled for later disposal. The collection method involved construction of a decontamination pad large enough to clean two hundred footage of hollow stem augers and the drill rig. The decon pad measured 20 by 40 ft. for a total area of 800 ft.^{2} to decon. The decon pad construction consisted of placing ¾ inch ply-wood boards on the ground, surrounding the pad with wooden boards (2 x 12 inches by 20 ft.), then over laying everything with a 40 mil mylar linear. The decon pad was inspected daily to insure that no decon waters were escaping through possible tears in the linear. The containers are limited to the designated areas pending classification and disposal.

Personal health and safety procedures were used to limit exposure to contaminants.

2.0 Site Specific Lithology

The site specific lithology as determined by previous subsurface investigations conducted at the CORCO facility is the Quaternary Alluvial Deposits and the Tertiary Ponce Limestone. Previous investigations in these two formations were conducted by Versar, Inc. (1986), Roy F. Weston, Inc. (1989), and GDC Engineering, Inc. (1994).

The boring locations of the Phase I: Subsurface Oil Investigation are based on data derived from previous investigations at the CORCO Facility and the EPA approved Weston Work Plan. The position of the soil borings was made to complement data gathered from the previous investigations and gather enough data to form a facility wide subsurface data base.

The geology at the CORCO Facility has been determined to be the Quarternary Alluvial Deposits and the Tertiary Ponce Limestone. These formations were the lithographic units of interest during the Phase I: Subsurface Oil Investigation.

2.1 Quarternary Alluvial Deposits

The Quarternary Alluvial Deposits are located in the low lying regions, at the CORCO Facility, south of Route 127. The Phase I investigation advanced eight (8) piezometer soil borings in the alluvial deposits to a maximum depth of thirty (30) feet below-land-surface. The elevation range, for the soil borings, was from 4.69 to 11.84 feet above mean sea level (ft. msl).

The soil borings, in the alluvial, indicate that there were two or more depositional environments in the area investigated. This can be seen in **Figure 6: Cross-Section A - A'**, which shows the lithology encountered in soil borings PD-1 through PD-8. The soil facies range from peat, to mixtures of clay to gravels. The composition of the facies indicates a wide energy range during the depositional environments. This energy was applied by waves and currents affecting the composition of the facies. The rounding, sorting and winnowing of the facies exhibit medium energy ranges, the textural maturity, and high energy ranges or textural inversions.

The lithology can be interpreted as being constructed of three zones. The first zone is varying grades of silty clay to silty clayey gravel. This appears to be fill material. The fill material originates from the Ponce Limestone and most likely was deposited during construction of the CORCO Tank Farm. The second zone shows facies of diverse compositions of peat to organic silty clays. The third zone shows facies of clay, silt and sands.

The soil borings PD-1 through PD-8 indicate a relatively moderate energy depositional environment with in the second depositional zone. These facies were encountered at five to twenty three (5 to 23) ft. bls. The facies, in these borings, are varying compositions of peat to organic silty clays. A peat zone was found in PD-2 at ten to twelve (10 to 12) ft. bls. To the east, in borings PD-5 and PD-7, clay lenses were found at ten to fourteen (10 to 14) ft. bls. Boring PD-8 showed a gravelly sand at ten to fifteen (10 to 15) ft. bls, with in the second depositional zone.

The third zone was encountered at sixteen to twenty-two (16 to 22) ft. bls. This zone has silty sand, clayey sand and gravelly sand facies. The sediments range from well sorted grains in a clay matrix to sub-rounded grains in a silty clay matrix. This is indicative of a high energy depositional environment, by the textural inversions of the facies.

The Alluvial Deposits show a range of energy during the depositional environment. The textural maturity of the facies falls with in the immature, sub-mature to mature ranges. The depositional environments in these energy ranges are flood plain, lagoon/swamp, river channel, and beach and bar environs. The facies also exhibit textural inversions that indicate multiple source material or reworked older sediments into primary deposits.

The depositional environment, encountered during the investigation of the Alluvial Deposits, is reflected by the textural maturity and textural inversions of the facies composition. The older facies, third depositional zone, exhibit a beach-bar composition. The second depositional zone shows a range of maturity and textural inversions that is indicative of low to moderate energy environs. The winnowing and sorting of the second zone facies exhibits deposition features of Lagoon/swamp and river/splay deposits. These findings are consistent with the U.S. Geological Survey report on the water resources of the Tallaboa Valley (Grossman, et. al. 1972).

2.2 Tertiary Ponce Limestone

The Tertiary Ponce Limestone deposits are located in the upland regions, at the CORCO Facility, north of Route 127. The Phase I investigation advanced twenty-six (26) piezometer soil borings in the Ponce Limestone deposits to a maximum depth of one hundred and ninety (190) feet below-land-surface. The elevation range, for the soil borings, was from 29.56 to 164.25 feet above mean sea level (ft. msl).

The twenty-six (26) soil borings drilled in the Ponce Limestone are located north of Route 127. The lowest string of soil borings, PD-9 through PD-18, are located south of the process areas at two elevation ranges of approximately 45 to 55 ft. msl and 90 to 105 ft. msl. These borings are spaced equal-distance, on an west to east bearing, from southwest of Tank 1011 to due east of PROLAB. The second string of soil borings, PD-23, PD-24, PD-19, PD-20, PD-21, PD-27, PD-28, PD-29, and PD-22, are located on the roadway north of the process areas. The second string of borings is at two elevation ranges of approximately 90 to 105 ft. msl and 145 to 190 ft. msl. These borings are spaced equal-distance, on a west to east bearing, from due west of Tank 965 to due north of C.P.I. 1. The third string of soil borings, PD-30, PD-31, PD-32, PD-25, and PD-26, at two elevation ranges of approximately 90 to 105 ft. msl and 145 to 190 ft. msl. These borings are spaced equal-distance, on a west to east bearing, from due west of Tank 955 to south east of Tank 973. The third string of soil borings is located south of the MIS Area.

The three strings of soil borings have been plotted as cross-sections. The lithology of the lowest string of soil borings is **Figure 7: Cross-Section B - B'**; the lithology of the second elevation string is **Figure 8: Cross-Section C - C'**; and the lithology of the third elevation string is **Figure 9: Cross-Section D - D'**.

Most of the Ponce Limestone is a yellowish-white chalky limestone. The Ponce Limestone is generally massive, but includes some thin dense strata and clay facies. The formation is commonly fossiliferous (USGS, 1972). The Ponce Limestone at the CORCO Facility trends 86 to 94 degrees east and dips 18 to 22 degrees south.

The Ponce Limestone can be chemically classified as: 1) allochems, 2) microcrystalline calcite, and 3) sparry calcite. The Ponce generally contains sparry calcite and in locations is highly fossiliferous. The Ponce commonly falls within the Sparry Allochemical Limestone (sparites) Compositional Classification. The Type I: sparites indicates the limestone was deposited in an environment of vigorous winnowing action and pretty efficient sorting (R.L. Folk, Petrology of Sedimentary Rocks, 1980). This can be seen in the Ponce Limestone as the formation often shows good bedding, close packing and good orientation of allowchems. This indicates the depositional environment, of the Ponce Limestone at the Facility, was generally a high energy environment with strong currents with areas of low energy weak currents.

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This energy environment is consistent with the depositional features evidence at the CORCO Facility in the Ponce Limestone. The reef complex structures would show both high and low energy depositional features such as wash-outs and winnowing effects, which the Ponce does in both textural and compositional variation. The compositional diversity, of the Ponce Limestone, ranges from sparry calcite to microcrystalline calcite. The reef complex typically has areas of very strong currents, short lived and weak currents.

The clastic limestone classification, for the Ponce Limestone, ranges from a calcisilite to a calcirudite according to the Clastic Limestone Classification System (American Association of Petroleum Geologists, R. L. Folk, 1959). The calcite grain size ranged from fine to very coarse (0.03 mm to 2.0 mm) in all Phase I soil borings drilled in the Ponce Limestone. The borings PD-27, PD-28, and PD-29, the upper east-most string, evidenced some very hard zones of calcircudite at fifty-two to sixty-eight (52 to 68) ft. bls

The Ponce Limestone contains many structural features that can be generalized across the CORCO Facility. The bedding of the Ponce dips at eighteen to twenty-two (18 to 22°) degrees at the Facility. The Ponce Limestone strikes at eighty-six to ninety-four (86 to 94°) degrees east. Numerous joints and fractures, in the Ponce Limestone, can be evidenced in out-crops across the Facility. There are reef structures that cross the bedding plains. A complex reef structure out-crops due north of the Machine Shop and between PD-31 and PD-32. The structural features control the diagenesis of the limestone.

The dip, of the bedding plains, tend to influence the migration pathways at and to the water table. The numerous joints and faults effect vertical migration, with weathering occurring in these areas. The Tank Farm evidences two locals of considerable joints that dip at approximately two hundred (200°) degrees south, or perpendicular to the bedding plains of the Ponce Limestone. These areas are located on the second string of soil borings. The first zone of jointing was show in soil borings at PD-24, PD-19, PD-20 and PD-21. The second zone of jointing was show in soil borings at PD-28 and PD-29. The joint surface trace can been viewed in both the outcrops and on the Tank Farm roadway.

The 18 to 22° dip of the Ponce Limestone effects the horizontal pathways at the water table. This feature was evidenced at PD-17, PD-18, and PD-25. Small cavities of a soft "calcite gel" four to seven feet in height were encountered at the water table. The cavities at PD-17 and PD-18 were each filled with approximately 25 sacks of filter pack gravel. The cavity at PD-25 required approximately ten cu. yds. of gravel to be filled. These cavities cannot be viewed as phreatic caves as they were filled with a "calcite gel". This most likely is a localized solution mechanism of recharge and discharge.

The dip of the Ponce Limestone results in a relatively horizontal water table. The water table in the Ponce Limestone was generally encountered at two to five feet above mean sea level. The formation often showed "heaving sands" at or just below the point of saturation. This was evidenced in every soil boring, in the Ponce Limestone, drilled during the Phase I: Subsurface Oil Investigation. The widespread "heaving sands" is indicative of diffuse-flow pathways and the aquifer should act as a homogeneous, isotropic porous media (Applied Hydrology, Fetter, 1988).

The Ponce Limestone aquifer consistently was encountered near sea level, except at PD-13. The soil boring PD-13 lithology is typical of the Ponce Limestone, but the saturated zone is an anomaly compared to all other borings in the Ponce Limestone. The saturated zone was encountered at thirteen feet below land surface in PD-13. This saturated zone, at PD-13, is a "perched aquifer" above the water table. The level measurements also indicate PD-13 as an outlier.

3.0 Waste Management and Disposition

The drummed drill cuttings and decontamination wastes generated during the Phase I: Subsurface Oil Investigation are being stored on-site in an environmentally safe manner until proper disposal. CORCO will collect representative samples from the stock-piled waste soils and waters and analyze for selected volatile, semi-volatile and metals. The results of the analyses will be used to select an appropriate disposal option. The generated wastes are being stored on-site in labeled containers. The label is written in permanent metal marker and has the name of the generator and description of the contents of the waste generated.

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D. GROUNDWATER ASSESSMENT

The groundwater assessment for the Phase I: Subsurface Oil Investigation is primarily concerned with finding the presence and volume of free-phase product on the water table at the CORCO Facility. The validation of free-phase product, in the soil borings that indicated product, followed the development of the piezometer development.

The Phase I: Subsurface Oil Investigation piezometers were surveyed to meters above mean sea level. The survey data was converted to feet above mean sea level using the constant of 0.3048 feet per meter. The ground surface and piezometer pad elevations were converted to ft. msl using the same constant. The survey data was converted to ft. msl to keep the measurement and reporting units constant as drilling was recorded in ft. bls and static measurements were collected in 0.01 ft. increments.

The collected survey and fluid level monitoring data was utilized for basic groundwater characterization, at the CORCO Facility. The ground water parameters discussed in this section are flow direction, gradient, velocity, and hydraulic conductivity.

1.0 Survey Methodology

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At piezometer well completion, the location and elevation of the piezometer wells relative to a standard datum was established. The piezometer wells were accurately located and referenced to a vertical datum by a licensed surveyor in the Commonwealth of Puerto Rico.

The piezometer locations were surveyed from a standard reference Facility Grid Point and established USGS datum point. The licensed surveyor also surveyed the piezometer Top of Casing (TOC) elevations and elevation of the undisturbed land surface adjacent to the newly installed piezometer wells. The difference between these two elevations is equal to the amount of casing stickup for each piezometer well.

The piezometer wells were surveyed vertically and horizontally at three (3) points. These survey points are as follows:

1. ground surface due north;
2. pad surface due north and adjacent to the well casing; and
3. Top-of-Casing (TOC) due north.

The NORTH Top-of Casing (TOC) reference point serves as the precise reference point on the Phase I: Subsurface Oil Investigation piezometer wells.

2.0 Fluid Level Monitoring

On September 9, 1994, CORCO started the piezometer well development for all thirty-two piezometers installed during the Phase I: Subsurface Oil Investigation. The development of the thirty-two piezometers was completed on September 24, 1994. The developed piezometers were allowed to equilibrate seventy two (72) hours prior to level measurements. The level measurements were conducted on September 27, 1994. All thirty-two (32) piezometers, eight (8) Site Assessment monitor wells, and six (6) M.I.S. Area monitoring wells were measured using an Oil/Water Interface Probe. The Oil/Water Interface probe was utilized to validate the presence of Free-Phase hydrocarbons with in the piezometers listed above.

This section describes the methodology that was used during the piezometer development and the collection of groundwater and product level measurements from all wells at the CORCO Facility. Field measurements of pH, temperature and specific conductivity were recorded. All sampling and analytical methods will be conducted in accordance with <u>EPA SW-846: Test Methods For Evaluating Solid Waste</u>. Prior to use, the conductivity and pH meters were calibrated in accordance with manufactures recommendations and procedures established in SW-846.

The condition of the protective cover, well casing and surface pad were assessed and if the well conditions were not to the recommended RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD-U.S. EPA, 1986) standards, this was recorded in the field logs. The area around the well head and purge water container was covered with disposable plastic sheeting to avoid possible release of contaminated waters to the ground surface. The sampling personnel prepared the sampling equipment, sample containers and wore disposable protective gloves.

Prior to sampling, the fluid level measurement of total depth (TD) for each well was conducted and compared to the well completion data sheets in order to confirm well integrity and rate of sedimentation within each well. All measurements were recorded to the nearest hundredth (0.01) of a foot and referenced to a marked location on the well casing. The static water level measurements were collected by interface probe or an electric line probe (E-line). The interface probe was utilized to determine if there was a dense-phase immiscible layer within the well system. These instruments were the only non-dedicated equipment to enter the wells.

Each well was then developed (evacuated) to remove stagnant non-representative waters and sediments from the screened well facie. The procedures for well development were as follows:

1. After determining the depth to groundwater from top of casing (TOC), the volume of water to be evacuated from the well will be calculated by using the following steps:

- Determine the height of the column of fluid in the well by taking the difference between the value of TOC and TD.

- Determine the area of the well-bore using the following formula:

  Area $= \pi r^2$

  where:

  $\pi = 3.14$

  r is the radius of the well bore (in feet)

- Determine the borehole volume in gallons using the following formula:

  Volume = (7.48)(HA)

  where:

  7.48 is the factor for converting cubic feet to gallons

  H is the height of the column of water (in feet)

  A is the area of the well bore (in square feet)

- Multiply by 3 or 5 to determine minimum well bore volumes in gallons.
  (a minimum 5 well bore volumes to develop the well)
  (a minimum 3 well bore volumes to purge the well)

A quick method of conversion is:
One Casing Volume (gallons) = **H** x (gal/ft of water)
Conversions from well diameter to gal/ft of water are:

2" well = 0.17 gal/ft	4" well = 0.66 gal/ft
6" well = 1.5 gal/ft	8" well = 2.6 gal/ft

2. Once the volume of water to be evacuated is calculated the area around the well is prepared for purging of the wells. The ground surface, between the well head and development water barrel, is covered with 4 ml mylar and bermed (approximately 4 ft by 4 ft). Each well may be supplied with dedicated bailers and bailer rope.

3. Temperature, pH and specific conductivity will be measured in the field during the development process. A measure of each parameter will be recorded for each well volume of fluid removed. If a well is purged to dryness then it will be deemed not necessary to evacuate the total number of well volumes.

The time, volume, pH and specific conductance of the purged volumes of water was recorded in the field logs. After sufficient time to allow the well recovery, the static fluid levels (hydraulic head) was again measured with an interface probe or E-line. When the well had recovered to the approximate static water level the well was sampled.

The sampling equipment was decontaminated between each well use to prevent possible cross-contamination. Decontamination consisted of a phosphate-free detergent wash followed by a potable water rinse then a rinse with de-ionized water.

3.0 Groundwater Characterization

A number of wells have been installed at the CORCO Facility during various subsurface investigations.

To date, forty-six (46) piezometers and monitoring wells have been installed at the CORCO facility. In September, 1994, CORCO conducted the piezometer well development for all thirty-two installed piezometers. The thirty-two (32) piezometers, eight (8) Site Assessment monitor wells, and six (6) M.I.S. Area monitoring wells were measured using an Oil/Water Interface Probe. The Oil/Water Interface probe was utilized to validate the presence of Free-Phase hydrocarbons with in the piezometers and monitoring wells listed above.

3.1 Groundwater Flow Direction

The level measurements for the thirty-two piezometers, six MIS Area monitoring wells and eight RCRA monitoring wells were collected on the morning of September 27, 1994. The collected level measurements are tabulated in **Table 4**. The monitoring wells and piezometers that had free-phase product were corrected using a specific gravity of 0.90. The corrected measurements were then plotted as **Figure 10, Potentiometric Measurement Map (09/27/94)**. The groundwater flow is assumed to be steady-state, that flow is laminar and Darcy's Law is valid. These assumptions were made to generate the potentiometric surface at the Facility.

The level measurement at PD-13 was recorded at 18.81 ft. msl. This is an outlier. The piezometer is located in a perched aquifer. The static measurement at PD-13 was utilized in construction of the potentiometric surface as it is believed to be relevant to the characteristics of the water table. The level measurements at PD-13 agree with a hydraulic ridge.

The complex potentiometric surface, at the CORCO Facility, indicates several groundwater flow directions. The groundwater flows southeast towards Guayanilla Bay, northeast towards Tank Farm Central Area, and northwest towards the Tank Farm Central Area. The potentiometric measurements were plotted using the modeling program SURFER. These plots are **Figure 12: X-Y Potentiometric Measurement Map** and **Figure 13: XY-Z Potentiometric Measurement Map**. The model was used to verify the complex groundwater flow patterns.

A large hydraulic ridge is present trending northwest to southeast. The hydraulic ridge extends from PD-31 to PD-7. The level measurements of the ridge range from 7.09 to 18.81

ft msl. The piezometer level measurement, on the northwest to southeast hydraulic ridge, were PD-31 at 7.09 ft. msl, PD-19 at 10.60 ft. msl, PD-13 at 18.81 ft. msl, and PD-7 at 7.18 ft. msl. None of these wells had any recordable free-phase product.

3.2 Groundwater Gradient

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The hydraulic gradient, at the CORCO Facility, has been calculated for three groundwater flow directions. These flow directions are as follows:

Southeast towards Guayanilla Bay;
Northeast towards Tank Farm Central Area; and
Northwest towards the Tank Farm Central Area.

The hydraulic gradient is defined as the change in static head per unit distance in a given direction. The hydraulic gradient defines the direction of flow. The hydraulic gradient is calculated from wells with intermediate water levels (Heath, U.S.G.S. Paper 2220, 1989).

The groundwater gradient as calculated from the groundwater flow direction of southeast towards Guayanilla Bay utilizes PD-10, PD-11 and PD-2. The up-gradient wells, for the southeast groundwater flow direction, are PD-10 and PD-11 and the down-gradient well is PD-2. The level measurements are 2.13, 3.90, and 1.08 ft. msl, respectively. The distance between PD-10 and PD-2 is 678.73 ft., and the distance between PD-11 and PD-2 is 1,059.86 ft. The change in head between PD-2 and PD-10 is 1.05 ft., and between PD-11 and PD-2 is 2.82 ft. The calculated hydraulic gradient from PD-10 to PD-2 is 1.55×10^{-3} ft/ft, and from PD-11 to PD-2 is 2.66×10^{-3} ft/ft.

The average calculated hydraulic gradient, for the southeast groundwater flow direction, is 2.08×10^{-3} ft/ft.

The groundwater gradient as calculated from the groundwater flow direction of northeast towards the Tank Farm Central Area utilizes PD-31, PD-19 and PD-25. The up-gradient wells, for the southeast groundwater flow direction, are PD-31 and PD-19 and the down-gradient well is PD-25. The level measurements are 7.09, 10.60, and 3.38 ft. msl, respectively. The distance between PD-31 and PD-25 is 1,415.80 ft, and the distance between PD-19 and PD-25 is 724.40 ft. The change in head between PD-31 and PD-25 is 3.71 ft., and between PD-19 and PD-25 is 7.22 ft. The calculated hydraulic gradient from PD-31 to PD-25 is 2.62×10^{-3} ft/ft, and from PD-19 to PD-25 is 1.00×10^{-2} ft/ft.

The average calculated hydraulic gradient, for the northeast groundwater flow direction, is 1.00×10^{-2} ft/ft.

The groundwater gradient as calculated from the groundwater flow direction of northwest towards the Tank Farm Central Area utilizes PD-16, PD-28 and PD-27. The up-gradient wells, for the southeast groundwater flow direction, are PD-16 and PD-28 and the down-gradient well is PD-27. The level measurements are 4.70, 4.81, and 3.54 ft. msl, respectively. The distance between PD-16 and PD-27 is 656.58 ft., and the distance between PD-28 and PD-27 is 446.82 ft. The change in head between PD-16 and PD-27 is 1.16 ft., and between PD-28 and PD-27 is 1.27 ft. The calculated hydraulic gradient from PD-16 to PD-27 is 1.77×10^{-3} ft/ft, and from PD-28 to PD-27 is 2.84×10^{-3} ft/ft.

The average calculated hydraulic gradient, for the northwest groundwater flow direction, is 2.30×10^{-3} ft/ft.

3.3 Hydraulic Conductivity

The hydraulic conductivity is a measure of a materials ability to transmit water.

The hydraulic conductivity (K) is estimated from the particle size distribution using the Hazen formula:

$$K = A(d_{10})^2$$

> d_{10} is equal to the effective grain size, which is that grain size diameter at which 10 percent by weight of the particles are finer and 90 percent are coarser (Freeze and Cherry, 1979)
>
> A is equal to 1.0 when K is in units of cm/sec and d_{10} is in mm.

The following is a list of the sample point, depth below ground surface and analytical d_{10} results used to estimate the hydraulic conductivity at the CORCO Facility:

Sample Point	Depth (ft. bls)	d_{10} (mm)
PD-10	45-47	0.1
PD-14	40-42	0.01
PD-17	44-46	N/A
PD-31	105-107	0.1
PD-26	170-172	0.1
PD-29	120-122	0.01

The conversion constant of 2,835 ft/day is used to convert hydraulic conductivity units reported in cm/sec to ft/day. The hydraulic conductivity across the CORCO Facility ranges from 28.35 ft./day to 283.5 ft./day.

3.4 Groundwater Velocity

The groundwater velocity is directly related to hydraulic gradient. The average linear velocity (v) of the groundwater at the CORCO Facility was calculated using Darcy's Law. Darcy's Law is as follows:

$$v = -\frac{Ki}{n_e}$$

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where:

K is the hydraulic conductivity (length/time)
i is the hydraulic gradient (length/length)
n_e is the effective porosity

4.0 Extent of Free-Product on Groundwater

The vertical positions of the well screens were based on the physical/chemical characteristics of a hydrocarbon product. The lengths of the well screens were based on the approved Phase I: Subsurface Oil Investigation Work Plan (Weston, 1990). The hydrocarbons act as Light Non-Aqueous Phase Liquids (LNAPL's) that migrate in the capillary zone just above the water table. The piezometer wells are screened five (5) feet in the capillary fringe and fifteen (15) feet into the water table. This configuration should allow detection of the free-product during periods of minimum and maximum elevations of the water table.

The Well Development Program for the Phase I: Subsurface Oil Investigation start date was on September 9, 1994 with completion on September 24, 1994. The developed piezometers were allowed to equilibrate seventy two (72) hours prior to level measurements. The thirty-two (32) piezometers, eight (8) Site Assessment monitor wells, and six (6) M.I.S. Area monitoring wells were then measured using an Oil/Water Interface Probe. The level measurements were conducted on September 27, 1994 between the hours of 8:15 AM and 12:27 PM. Two crews were utilized to collect the level measurements between periods of possible tidal influence.

Thirty-two (32) piezometers were installed at the CORCO Facility during the Phase I: Subsurface Oil Investigation. The piezometers that had indications, during installation, of free-product are listed below:

PD-4, PD-9, PD-10, PD-11, PD-12, PD-14, PD-15, PD-16, PD-17, PD-18, PD-20, PD-23, PD-25, PD-26, PD-27, PD-28, PD-29, PD-30, PD-31 and PD-32.

The Oil/Water Interface probe was utilized to validate the presence of free-product within the piezometers listed above. Concurrent with the piezometer level analysis, the Oil/Water Interface Probe was utilized to validate the presence of Free-Phase and/or liquid level at the six (6) monitoring wells at the M.I.S. Area and the eight (8) Site Assessment monitor wells.

During the field level measurements the following piezometers that had prior indications of free-phase product during installation did not have any free-phase product as measured, on September 27, 1994, with an oil/water interface probe: PD-12, PD-29, PD-30, and PD-31 (refer to **Table 4, Level Measurements**).

The estimation of free-product at the CORCO Facility has been derived from field measurements collected by field personnel. The field measurements were collected using oil/interface probes. The field measurements were collected on the morning of September 27, 1994. The measurements were collected within a five (5) hour period so that tidal influences would not impact the data.

The free-phase product level measurements data was reduced and plotted as a product isopach. The data reduction is the measurement from TOC to the product level minus the measurement from TOC to static water level. The measured product levels were then plotted as an isopach. The isopach indicates that there are five (5) areas of free-phase product at the CORCO Facility. These areas of Free-phase product are designated as: the MIS Area, the Tank Farm West Area, the Facility South Area, the Tank Farm Central Area, and the Process Area (refer to **Figure 5, Product Isopach 09/27/94**).

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4.1 Extent of Groundwater Impact

The extent of the groundwater impact from free-phase product is estimated from the amount of product measured in the monitoring wells and piezometer wells at the CORCO Facility on September 27, 1994. The level measurements were collected following a rainfall of approximately three (3) inches after a substantial period of drought. The infiltration/precipitation at the site may have distorted the in-situ product levels during this level measurement program. The free-phase product and static water levels will be confirmed in the next level measurement.

The field level measurements were collected on the morning of September 27, 1994. The measurements were collected within a five (5) hour period so that tidal influences would not impact the data.

The MIS Area field level measurements were collected between the period of 10:40 AM and 11:27 AM. The Phase I: Subsurface Oil Investigation piezometers field level measurements were collected between the period of 8:15 AM and 11:38 AM. The Eastern Lagoon field monitoring wells level measurements were collected between the period of 12:15 AM and 12:25 AM. The Western Lagoon monitoring wells field level measurements were collected between the period of 11:49 AM and 12:15 AM on September 27, 1994.

The MIS Area monitoring wells showed free-phase product levels ranging from non-detect to 10.20 feet. The largest layer of free-phase was detected in monitoring well MW-05, with 10.20 feet. MW-01 and MW-02 did not show any free-phase product. Monitoring wells MW-03, MW-04, and MW-06 exhibited free-phase levels of 8.63 ft., 6.96 ft., and 7.98 ft., respectively.

The Tank Farm West Area had free-phase product levels that ranged from non-detect to 10.23 ft. Piezometer PD-11 had the greatest amount of product at a thickness of 10.32 ft. Piezometer wells PD-30, PD-31, PD-24, PD-12, PD-3, PD-2 and PD-1 did not contain any free-phase product as measured by the oil/water interface probe. Monitoring well WL-1 contained 0.62 ft. of free-phase. The piezometer wells PD-9 and PD-23 had 9.71 ft. and 9.35 ft., respectively. Piezometer PD-10 had 10.23 ft. of product.

The Facility South Area had only one piezometer that showed free-phase product. This piezometer was PD-4 with 12.06 ft. of product.

The Tank Farm Central Area piezometer wells showed free-phase product levels ranging from non-detect to 10.15 feet. The largest layer of free-phase was detected in piezometer PD-26, with 10.15 feet. Piezometer wells PD-19, PD-24, PD-12, PD-13, PD-3, and PD-21 did not contain any free-phase product as measured by the oil/water interface probe. Piezometer wells PD-20, PD-25, and PD-32 showed free-phase product levels of 8.34 ft., 9.20 ft., and 9.92 ft., respectively.

The Process Area piezometers had free-phase product levels that ranged from non-detect to a high of 9.13 ft. of product. The high was measured in PD-27. Piezometer wells PD-19 and PD-22 did not show any free-phase as measured by the oil/water interface probe. The piezometers PD-14, PD-17, and PD-18 had free-phase levels of 0.65 ft., 3.47 ft., and 3.59 ft., respectively. The piezometers PD-15, PD-16, and PD-28 showed product levels of 9.08 ft., 7.60 ft., and 7.96 ft., respectively.

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4.2 Product Characterization

The product at the CORCO Facility has been characterized by analyzing material collected during the Phase I: Subsurface Oil Investigation. The collected product was submitted to and analyzed by the Puerto Rico Oil Laboratory (PROLAB) at the CORCO Facility. The analyses preformed, by PROLAB, on the product was: IBP Distillation, Reid Vapor Pressure (R.V.P.), A.P.I. Gravity, Sulphur Weight %, Aromatics Volume %, Benzene Weight %, and Heating Value Gross in BTU/Lb. The analyses, conducted by PROLAB, indicates the product is mixture of Solvents - Gasoline - Heavy Gas Oil - Lubricating Oil.

The product was collected during the Phase I: Subsurface Oil Investigation soil boring and piezometer installation. When a free-phase product was encountered during the drilling of the soil borings, it was always at the water table. Various volumes of product would be pulled up-hole while removing the drill stem from the augers. The product ranged from "gasoline" to a "muddy slush" type material. The product was collected in a five gallon bucket, strained and immediately placed in a one liter glass sample bottle. The free-phase product sample was then delivered to PROLAB. The time period from product collection to deliver to the laboratory was less than twenty minutes (≤ 20 min.).

The analyses preformed, by PROLAB, on the product was: IBP Distillation, Reid Vapor Pressure (R.V.P.), A.P.I. Gravity, Sulphur Weight %, Aromatics Volume %, Benzene Weight %, and Heating Value Gross in BTU/Lb. The PROLAB results are as follows: the IBP Distillation Curve ranges from 100 to 310; the R.V.P. Reid Vapor Pressure ranges from a low of 0.0 to 9.7 (Lb./sq. in.); the A.P.I. Gravity had, at 60° F, ranges from 32.7 to 71.6 °API; the Sulphur weight, measured as a percent volume, ranged from 0.001 to 0.33 %; the Aromatics volume, measured as a percent volume, ranged from 15.6 to 82.1 %; the Benzene weight, measured as a percent volume, ranged from 2.10 to 34.70 %; and the Heating Value Gross was analyzed for two samples, the results were approximately 19,8000 BTU/Lb. The PROLAB results are tabled in **Table 6, Product Characterization.**

The PROLAB analyses indicate the free-phase product is a mixture of crude petroleum fractions. The product mixture ranges from the light gas fractions to heavier lubricating oils, depending on the sample location. The IBP Distillations show that the majority of the product sampled is a blend of diesel and gasoline. The sample collected from boring PD-4 contained the heavier crude fractions, and therefore indicates a different source area.

4.3 Product Mass-Balance

The Product Mass-Balance for the CORCO Facility is an approximation. The product mass-balance is derived from one (1) level measurement event. This event followed a period of substantial rainfall at the site. The mass-balance will be "fine tuned" following the next level measurement collected at the facility.

The MIS Area has a square footage of 263,034 $ft.^2$. The Tank Farm West Area has a square footage of 422,727 $ft.^2$. The Facility South Area has a square footage of 119,086 $ft.^2$. The Tank Farm Central Area has a square footage of 595,227 $ft.^2$. The Process Area has a square footage of 1,189,887 $ft.^2$. This is a total square footage of 2,562,961 ft^2 that has free-phase product at the CORCO Facility.

The total area was determined between the contour intervals for each free-product plume at the facility. These intra-plume areas were multiplied by the average thickness of the product within each contour interval. This resulted in a volume, measured in cubic feet, for each contour interval for each of the five areas of free-phase product at the CORCO Facility.

The product volume as calculated in cubic feet, within the five areas of free-phase product, was further reduced to give a volume in barrels of free-phase product. This calculation was performed using the constants of: 7.4805 gallons per cubic foot (7.4805 gal./ft^3) and forty two gallons per barrel (42 gal./barrel). This series of calculations resulted in approximate volumes of free-phase product in the five areas of free-phase product at the facility. The inter-contour volume results were produced in this calculation.

The volume of free-phase product, in the five areas, at the CORCO Facility is as follows:

The MIS Area contained 83,551 barrels of free-phase product;
The Tank Farm West Area contained 311,694 barrels of free-phase product;
The Facility South Area contained 26,481 barrels of free-phase product;
The Tank Farm Central Area contained 379,865 barrels of free-phase product; and
The Process Area contained 577,759 barrels of free-phase product.

The calculations and the results of the product mass-balance are shown in **Table 5, In-Situ Oil Mass-Balance**. The table shows the inter-contour area and the inter-contour volumes in gallons and barrels. The total volume of free-phase product, at the CORCO Facility, is 1,379,351 barrels of product.

5.0 Waste Management and Disposition

The drummed drill cuttings and decontamination wastes generated during the Phase I: Subsurface Oil Investigation are being stored on-site in an environmentally safe manor until proper disposal. CORCO will collect representative samples from the stock-piled waste soils and waters and analyze for selected volatile, semi-volatile and metals. The results of the analyses will be used to select an appropriate disposal option. The generated wastes are being stored on-site in labeled containers. The label is written in permanent metal marker and has the name of the generator and description of the contents of the waste generated.

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III. CONCLUSIONS AND RECOMMENDATIONS

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III. CONCLUSIONS AND RECOMMENDATIONS

1.0 CONCLUSIONS

2.0 RECOMMENDATIONS

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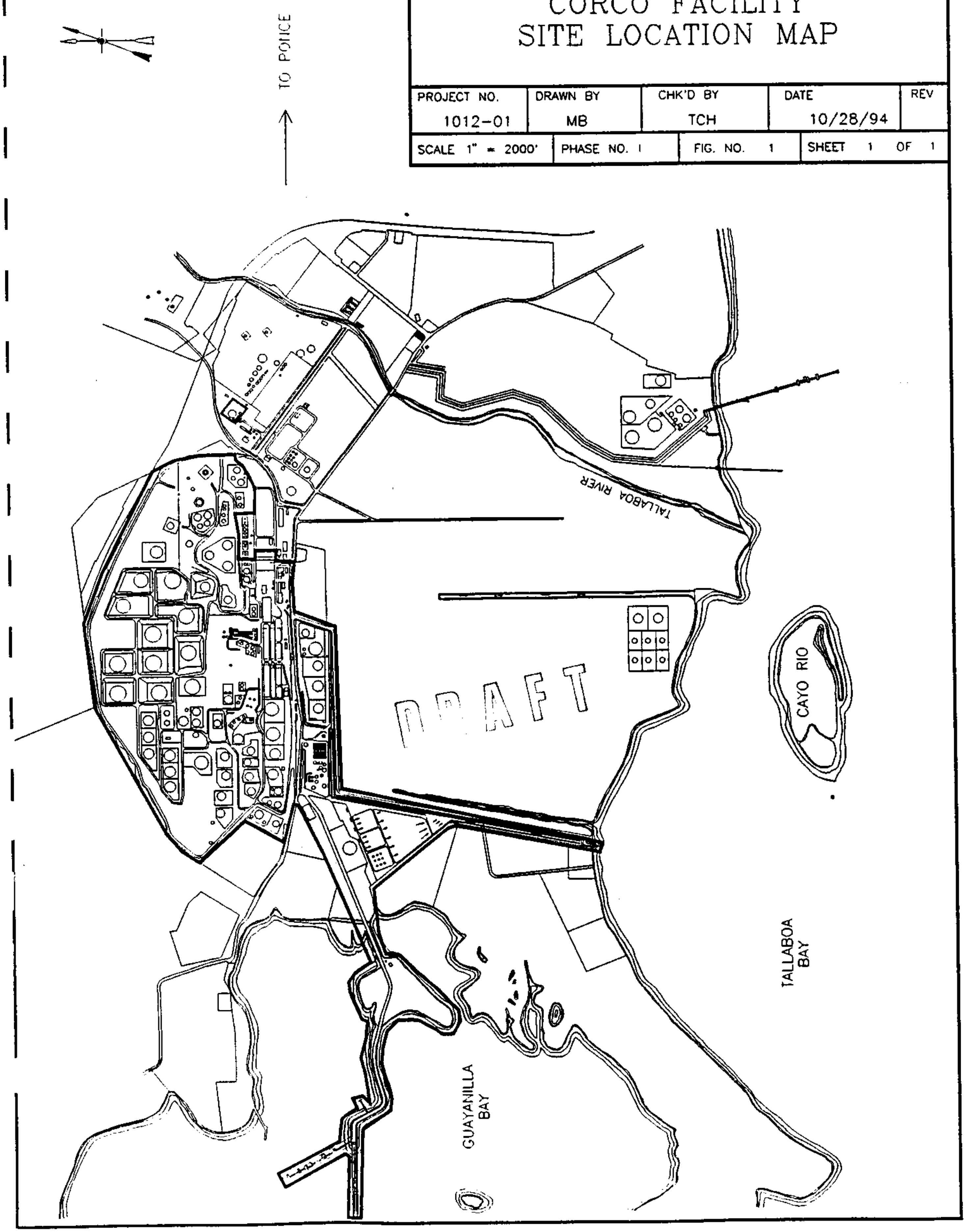
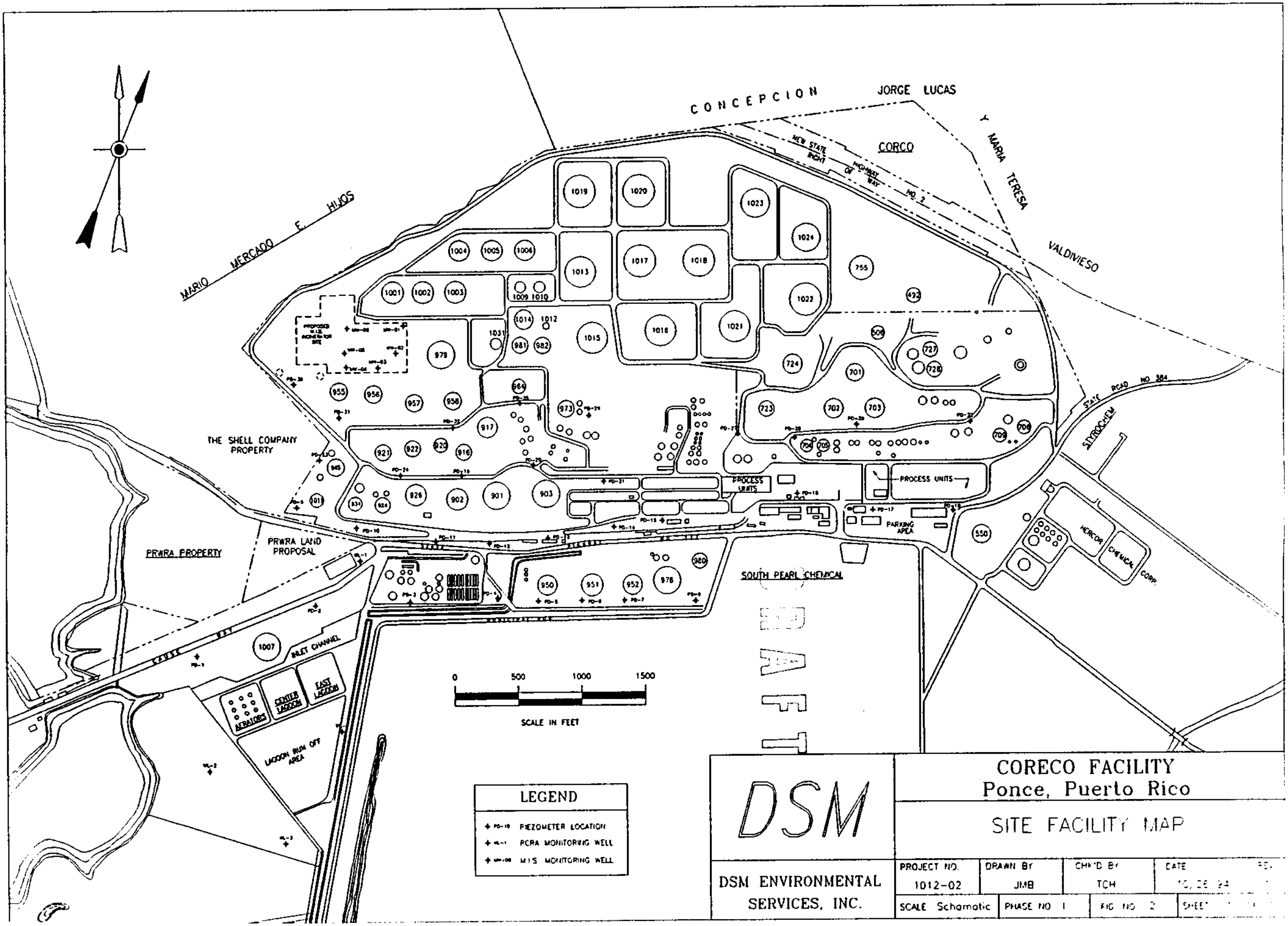
DSM Environmental Services, Inc.

CORCO FACILITY SITE LOCATION MAP

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1012-01	MB	TCH	10/28/94	

SCALE 1" = 2000'	PHASE NO. I	FIG. NO. 1	SHEET 1 OF 1





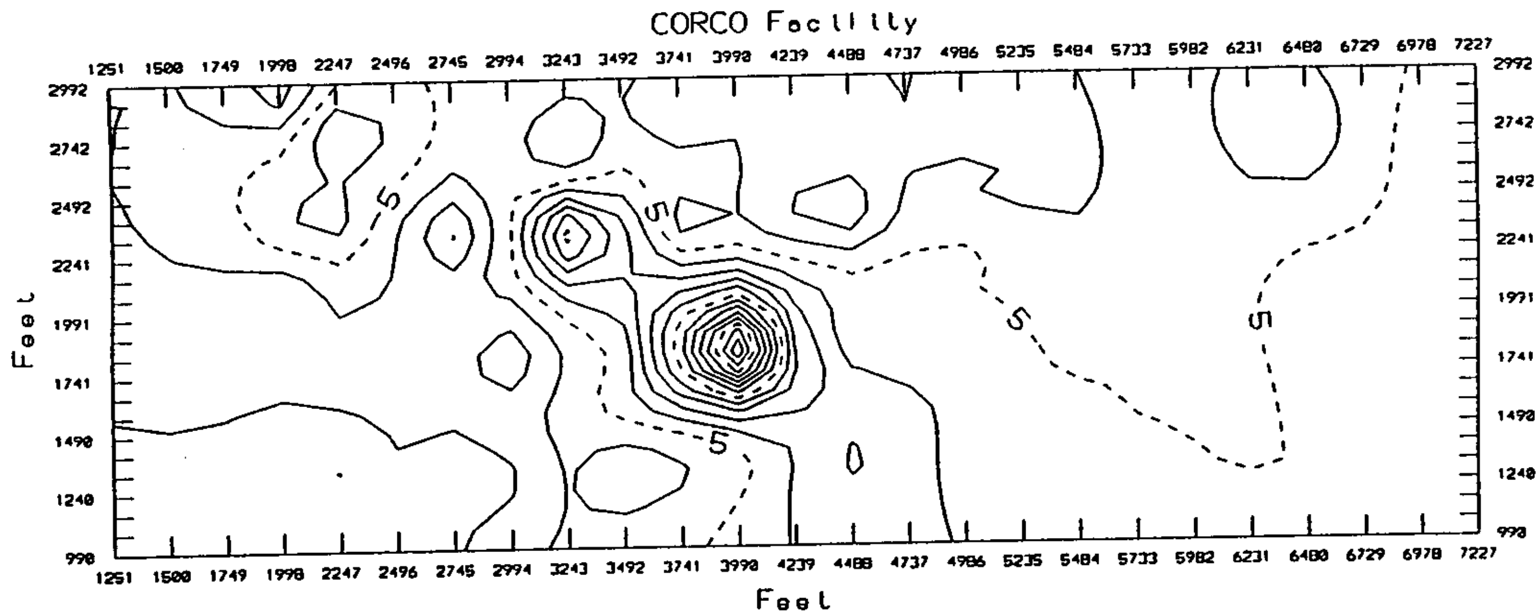
DSM	COREČO FACILITY Ponce, Puerto Rico			
	SITE FACILITY MAP			
DSM ENVIRONMENTAL SERVICES, INC.	PROJECT NO. 1012-02	DRAWN BY JMB	CHK'D BY TCH	DATE 10/26/94
	SCALE Schematic	PHASE NO 1	FIG NO 2	SHEET

FIGURE 4

UNIFIED SOIL CLASSIFICATION SYSTEM

GRADATION AND PLASTICITY CHARACTERISTICS (Excluding Particles Larger Than 3 inches)				LABORATORY CONFIRMATION	GROUP SYMBOL	SOIL NAMES
PREDOMINANTLY COARSE-GRAINED >50% of Grains Larger Than 0.75mm	GRAVEL >50% of Course Grains Larger Than 4.76 mm		CLEAN <5% Fines	D60/D10 > 4	GW	Well Graded GRAVEL or SANDY GRAVEL
				Not Meeting Gradation Requirements for GW	GP	Poorly graded, uniform, or gap-graded GRAVEL or SANDY GRAVEL
			WITH FINES >5% Fines	Atterberg Limits Below A-Line OR PI<4	GM	SILTY GRAVEL
				Atterberg Limits Above A-Line AND PI>7	GC	CLAYEY GRAVEL
	SAND >50% of Course Grains Smaller Than 4.76 mm		CLEAN <5% Fines	D60/D10 > 4	SW	Well-Graded SAND or GRAVELLY SAND
				Not Meeting Gradation Requirements for SW	SP	Poorly graded, uniform, or gap-graded SAND or GRAVELLY SAND
			WITH FINES <5% Fines	Atterberg Limits Below A-Line OR PI<4	SM	SILTY SAND
				Atterberg Limits Above A-Line AND PI>7	SC	CLAYEY SAND
PREDOMINANTLY FINE-GRAINED >50% of Grains Less Than 0.075mm	Plasicity Characteristics of fraction Larger Than 0.425mm	SILT Atterberg Limits below A-line or PI<4	INORGANIC	Liquid Limit<50	ML	Nonplastic, slightly plastic, or moderately plastic SILT, CLAYEY SILT, SANDY SILT,or GRAVELLY SILT
				Liquid Limit>50	MH	Highly plastic or moderately plastic SILT, CLAYEY SILT, SANDY SILT,or GRAVELLY SILT
			ORGANIC	Liquid Limit<50	OL	Slightly plastic or moderately plastic ORGANIC SILT (ORGANIC CLAY if Atterberg Limits above A-line)
				Liquid Limit>50	OH	Highly plastic or Very Highly plastic ORGANIC SILT (ORGANIC CLAY if Atterberg Limits above A-line)
		CLAY Atterberg Limits above A-line AND PI>7		Liquid Limit<50	CL	Slightly plastic, or moderately plastic CLAY, SILTY CLAY, SANDY CLAY,or GRAVELLY CLAY
				Liquid Limit>50	CH	Highly plastic or moderately plastic SILT, CLAYEY SILT, SANDY SILT,or GRAVELLY SILT
HIGHLY ORGANIC (identified by spongy feel)					Pt	PEAT

Potentiometric Measurement Map



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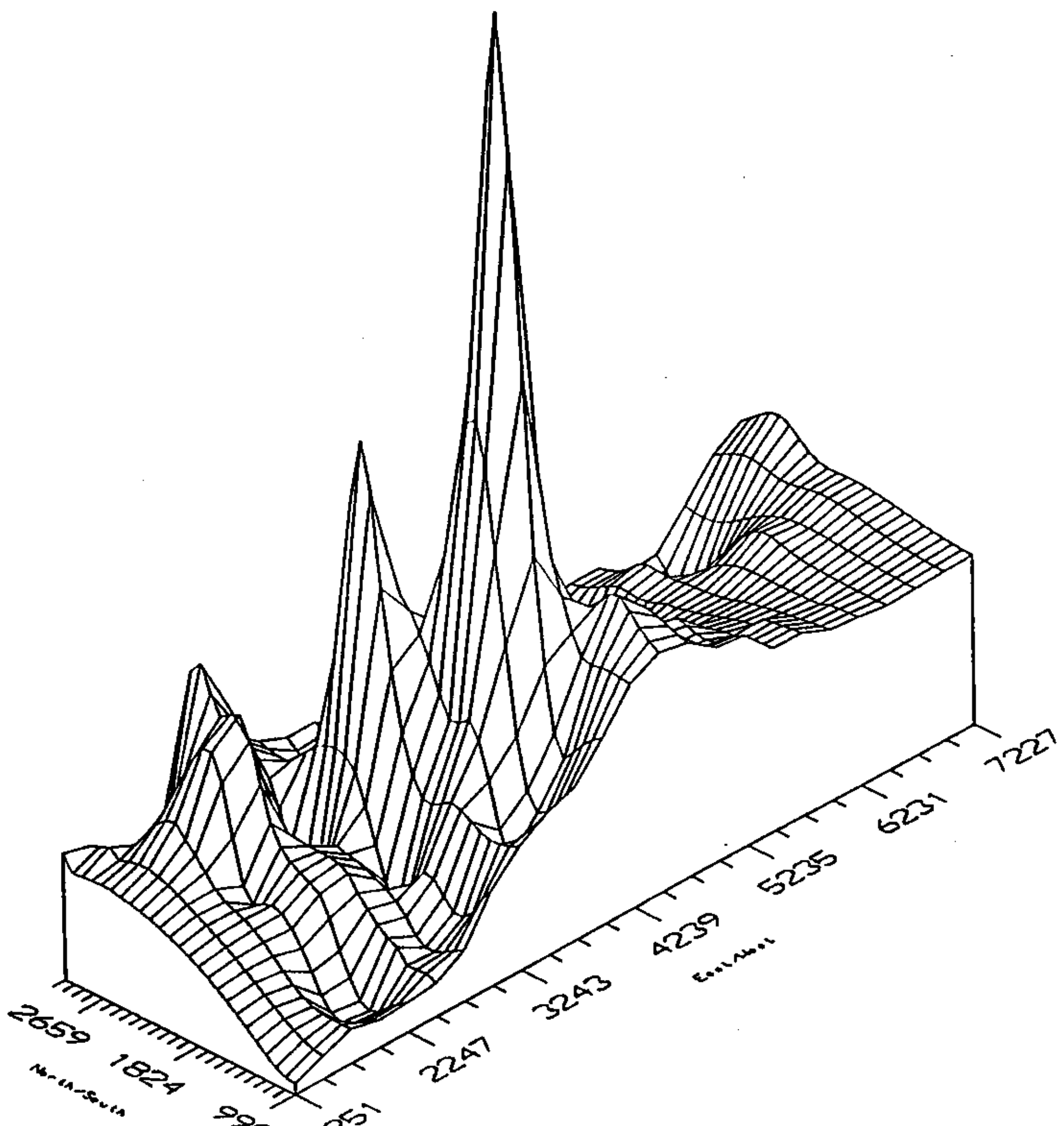
DSM Environmental Services, Inc.				
X-Y POTENTIOMETRIC MEASUREMENT MODEL				
PROJECT NO. 1012-02	DRAWN BY TCH	CHK'D BY TCH	DATE 10/28/94	REV.
SCALE Schematic	PHASE NO 1	FIG NO. 11	SHEET	



Potentiometric Measurement Map

DSM Environmental Services, Inc.				
XY-Z POTENTIOMETRIC MEASUREMENT MODEL				
PROJECT NO. 1012-02	DRAWN BY TCH	CHK'D BY TCH	DATE 10/28/94	REV.
SCALE Schematic	PHASE NO. 1	FIG NO 12	SHEET 1 OF 1	

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TABLE 1

FREE-PRODUCT THICKNESS IN THE MIS AREA MONITORING WELLS MEASURED MARCH, 1994 CORCO FACILITY, PONCE P.R.

WELL NUMBER	MEASURED FREE-PHASE PRODUCT THICKNESS (ft.)
MW-01	ND
MW-02	ND
MW-03	9.30
MW-04	6.74
MW-05	7.69
MW-06	8.54

TABLE 2

Collected Soil Samples
Phase I: Subsurface Oil Investigation
CORCO Facility, Ponce P.R.

No.	PD-4	PD-9	PD-10	PD-11	PD-12	PD-13	PD-14	PD-15	PD-16	PD-17	PD-18	PD-19	PD-20	PD-21	PD-22	PD-23	PD-24	PD-25	PD-26	PD-27	PD-28	PD-29	PD-30	PD-31	PD-32
3	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12
4					15-17	15-17	15-17	15-17	15-17	15-17		15-17	15-17	15-17											15-17
5		20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	
6	16-18		25-27		25-27		25-27	25-27	25-27	25-27		25-27		25-27								25-27			25-27
7		30-32	30-32	30-32	27-29	24-26	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32
8	20-22		35-37	35-37	29-31			35-37	35-37		35-37	35-37	35-37		35-37			35-37						35-37	35-37
9		40-42					34-36		40-42	44-46				40-42		40-42	40-42		40-42	40-42	40-42	40-42	40-42		
10			39-41	39-41	33-35		36-38	39-41			39-41	45-47						45-47						45-47	45-47
11		50-52			35-37			41-43	50-52		44-46	50-52	50-52	50-52	50-52	50-52	50-52			50-52	50-52	50-52	50-52		50-52
12		55-57					40-42											55-57	55-57			55-57		55-57	
13		60-62	45-47	45-47	40-42							60-62	60-62	60-62	60-62	60-62	60-62			60-62	60-62		60-62	60-62	60-62
14																65-67		65-67	65-67			65-67		65-67	
15												70-72	70-72	70-72	70-72	70-72	70-72			70-72					70-72
16		66-68														75-77		75-77	75-77		75-77	75-77	75-77	75-77	
17												80-82	80-82	80-82		80-82	80-82	80-82		80-82			80-82		
18												85-87		85-87	85-87	85-87			85-87			85-87	85-87	85-87	85-87
19												90-92	90-92	90-92		90-92	90-92	90-92		90-92	90-92		90-92		
20													95-97			95-97			95-97			95-97		95-97	95-97
21												100-102		100-102	100-102		100-102	100-102		100-102				100-102	
22															105-107				105-107	105-107		105-107		105-107	105-107
23														110-112			110-112	110-112		110-112				110-112	
24																			115-117			115-117			
25																		120-122		120-122		120-122			120-122
26															125-127		125-127		125-127						
27														130-132			130-132	130-132		130-132					130-132
28															135-137				135-137						
29																		140-142	140-142	140-142					140-142
30																		145-147							
31															150-152										150-152
32															155-157				155-157						155-157
33																			160-162						160-162
34																			165-167						
35															170-172				170-172						170-172
36																			175-177						
37																									
38															185-187										

TABLE 3

Piezometer Installation Dates, Depth, and Indications of Product

DATE	PIEZOMETER No.	DEPTH	Indication of Product
5/12/94	PD-8	25´ bls	
5/16/94	PD-7	25´ bls	
5/17/94	PD-6	25´ bls	
5/17/94	PD-5	25´ bls	
5/18/94	PD-4	25´ bls	Free-Phase
5/20/94	PD-3	25´ bls	
5/20/94	PD-2	25´ bls	
5/24/94	PD-1	25´ bls	
5/25/94	PD-9	71´ bls	Free-Phase
5/26/94	PD-10	48´ bls	Free-Phase
5/27/94	PD-11	53´ bls	Free-Phase
6/1/94	PD-12	42´ bls	Free-Phase
6/2/94	PD-13	28´ bls	
6/2/94	PD-14	43´ bls	Free-Phase
6/3 - 6/7/94	PD-16	52´ bls	Free-Phase
6/8/94	PD-15	45´ bls	Free-Phase
6/8 - 6/9/94	PD-17	45´ bls	Free-Phase
6/9 - 6/10/94	PD-18	45´ bls	Free-Phase
6/13 - 6/17/94	PD-30	107´ bls	Free-Phase
6/20 - 6/22/94	PD-23	104´ bls	Free-Phase
6/22 - 6/24/94	PD-19	105´ bls	
6/22 - 6/24	PD-31	117´ bls	Free-Phase
6/24 - 6/29/94	PD-24	147´ bls	
6/27 - 7/7/94	PD-32	175´ bls	Free-Phase
6/29 - 7/1/94	PD-20	105´ bls	Free-Phase
7/5 - 7/8/94	PD-25	160´ bls	Free-Phase
7/8 - 7/12/94	PD-26	180´ bls	Free-Phase
7/9 - 7/14/94	PD-21	140´ bls	
7/14 - 7/15/94	PD-28	100´ bls	Free-Phase
7/19 - 7/19/94	PD-29	135´ bls	Free-Phase
7/9 - 7/21/94	PD-27	135´ bls	Free-Phase
7/9 - 7/22/94	PD-22	190´ bls	

´ bls (feet below-land-surface)

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TABLE 4

LIQUID LEVEL MEASUREMENTS
Phase I: Subsurface Oil Investigation
Commonwealth Oil Refining Company
Penuelas, Puerto Rico

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WELL No.	Date Sampled	Casing Elevation (feet)[1]	Depth to PSH (feet)	Depth to Water (feet)	PSH Thickness (feet)	Corrected Water Level (feet)[2]
MW-01			ND		0.00	
	09/27/94		NA	NA	0.00	
MW-02			ND		0.00	
	09/27/94		ND	177.39	0.00	
MW-03			ND		0.00	
	09/27/94		169.42	178.05	8.63	
MW-04			ND		0.00	
	09/27/94		166.96	173.92	6.96	
MW-05			ND		0.00	
	09/27/94		162.52	172.72	10.20	
MW-06			ND		0.00	
	09/27/94		165.58	173.56	7.98	
EL-1		15.29	ND	9.88	0.00	5.41
	09/27/94		ND	10.07	0.00	5.22
EL-2		17.28	ND	16.34	0.00	0.94
	09/27/94		ND	16.26	0.00	1.02
EL-3		10.10	ND	9.35	0.00	0.75
	09/27/94		ND	9.21	0.00	0.89
EL-4		10.79	ND	10.75	0.00	0.04
	09/27/94		ND	11.61	0.00	-0.82
WL-1		8.03	ND	8.80	0.00	-0.77
	09/27/94		8.84	9.46	0.62	-0.87
WL-2		10.28	ND	9.64	0.00	0.64
	09/27/94		ND	9.37	0.00	0.91
WL-3		8.22	ND	6.93	0.00	1.29
	09/27/94		ND	6.71	0.00	1.51
WL-4		7.29	ND	5.40	0.00	1.89
	09/27/94		ND	5.19	0.00	2.10

TABLE 4 (Continued)
Liquid Level Measurements

WELL No.	Date Sampled	Casing Elevation (feet)[1]	Depth to PSH (feet)	Depth to Water (feet)	PSH Thickness (feet)	Corrected Water Level (feet)[2]
PD-1	09/27/94	7.51	ND	5.36	0.00	2.15
PD-2	09/27/94	11.71	ND	9.91	0.00	1.80
PD-3	09/27/94	10.40	ND	7.94	0.00	2.46
PD-4	09/27/94	11.35	7.03	19.09	12.06	3.12
PD-5	09/27/94	8.86	ND	5.63	0.00	3.23
PD-6	09/27/94	11.25	ND	5.21	0.00	6.04
PD-7	09/27/94	12.83	ND	5.65	0.00	7.18
PD-8	09/27/94	14.47	ND	9.18	0.00	5.29
PD-9	09/27/94	56.76	52.39	62.10	9.71	3.40
PD-10	09/27/94	39.86	34.94	45.17	10.23	3.90
PD-11	09/27/94	34.29	31.12	41.44	10.32	2.13
PD-12	09/27/94	32.74	ND	27.40	0.00	5.34
PD-13	09/27/94	33.53	ND	14.72	0.00	18.81
PD-14	09/27/94	35.27	29.99	30.64	0.65	5.22
PD-15	09/27/94	34.52	28.22	37.30	9.08	5.39
PD-16	09/27/94	40.68	35.22	42.82	7.60	4.70
PD-17	09/27/94	35.83	30.22	33.69	3.47	5.26
PD-18	09/27/94	39.04	33.26	36.85	3.59	5.42
PD-19	09/27/94	93.67	ND	83.07	0.00	10.60
PD-20	09/27/94	81.30	85.77	77.43	8.34	3.04
PD-21	09/27/94	98.30	ND	96.59	0.00	1.71
PD-22	09/27/94	168.25	ND	162.32	0.00	5.93
PD-23	09/27/94	93.38	85.59	94.94	9.35	6.85
PD-24	09/27/94	103.29	ND	101.35	0.00	1.94
PD-25	09/27/94	143.81	139.51	148.71	9.20	3.38
PD-26	09/27/94	163.43	159.12	169.27	10.15	3.29
PD-27	09/27/94	129.11	124.65	133.78	9.13	3.54
PD-28	09/27/94	83.70	78.09	86.05	7.96	4.81
PD-29	09/27/94	112.57	ND	109.57	0.00	3.00
PD-30	09/27/94	83.57	ND	81.10	0.00	2.47
PD-31	09/27/94	122.94	ND	115.85	0.00	7.09
PD-32	09/27/94	158.44	154.15	164.07	9.92	3.30

NOTE: ND = NON-DETECTED (NO IMMISCIBLE LAYER MEASURED)

(1) Referenced to mean sea level. Benchmark Located at CORCO Facility.

(2) Product specific gravity of 0.90 was used to calculate corrected ground water elevation.

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TABLE 5

IN-SITU OIL MASS-BALANCE
COMMONWEALTH OIL REFINING COMPANY
Penuelas, PUERTO RICO

M.I.S. Area						
Contour	**Perimeter Area**	**Area (sq. ft.)**	**Average Depth**	**Volume (cu. ft.)**	**Approximate Gallons**	**Approximate barrels**
0	437,015	236,034	2.5	590,085	1,324,239	31,530
5	200,981	178,449	7.5	1,338,368	3,003,497	71,512
10	22,532	22,532	10	225,320	505,652	12,039
TOTAL						83,551
Tank Farm West Area						
Contour	**Perimeter Area**	**Area (sq. ft.)**	**Average Depth**	**Volume (cu. ft.)**	**Approximate Gallons**	**Approximate barrels**
0	1,114,134	422,727	2.5	1,056,818	2,371,657	56,468
5	691,407	364,029	7.5	2,730,218	6,127,018	145,881
10	327,378	310,324	10	3,103,240	6,964,136	165,813
TOTAL						311,694
Facility South Area						
Contour	**Perimeter Area**	**Area (sq. ft.)**	**Average Depth**	**Volume (cu. ft.)**	**Approx. Gal.**	**Approximate barrels**
0	181,321	119,086	2.5	297,715	668,117	15,908
5	62,235	50,699	7.5	380,243	853,321	20,317
10	11,536	11,536	10	115,360	258,885	6,164
TOTAL						26,481
Tank Farm Central Area						
Contour	**Perimeter Area**	**Area (sq. ft.)**	**Average Depth**	**Volume (cu. ft.)**	**Approximate Gallons**	**Approximate barrels**
0	1,465,361	595,227	2.5	1,488,068	3,339,447	79,511
5	870,134	636,818	7.5	4,776,135	10,718,363	255,199
10	233,316	233,316	10	2,333,160	5,235,961	124,666
TOTAL						**379,865**
Process Area						
Contour	**Perimeter Area**	**Area (sq. ft.)**	**Average Depth**	**Volume (cu. ft.)**	**Approximate Gallons**	**Approximate barrels**
0	2,269,499	1,189,887	2.5	2,974,718	6,675,712	158,946
5	1,079,612	1,045,098	7.5	7,838,235	17,590,175	418,814
TOTAL						**577,759**
TOTAL APPROXIMATE VOLUME (Barrels)						**1,379,351**

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TABLE 6

PRODUCT CHARACTERIZATION
COMMONWEALTH OIL REFINING COMPANY
Penuelas, PUERTO RICO

Well No.	PD-4	PD-9	PD-10	PD-11	PD-14	PD-15	PD-16	PD-17	PD-18	PD-20	PD-25	PD-26	PD-27	PD-28	PD-29	PD-32
Sample Date	5/18/94	5/25/94	5/26/94	5/31/94	6/2/94	6/8/94	6/9/94	6/9/94	6/10/94	7/1/94	7/8/94	7/13/94	7/21/94	7/14/94	7/21/94	7/7/94
Distillation																
IBP	310	220	196	140	166	204	110	128	100	178	220	230	120	100	100	174
5%	370	246	236	194	196	238	136	156	114	212	240	256	156	120	120	214
10%	420	260	246	212	200	248	146	170	120	224	250	270	174	128	128	226
20%	458	276	268	242	210	264	160	186	124	238	268	288	198	140	138	240
30%	478	284	280	266	216	274	176	202	130	254	286	308	216	154	150	254
40%	496	306	292	286	230	282	194	222	136	266	308	330	240	172	162	262
50%	514	324	304	306	254	292	212	246	146	276	328	378	256	196	182	294
60%	530	352	324	326	272	302	238	266	158	284	366	430	270	224	210	290
70%	550	392	360	366	286	320	264	280	178	294	428	480	282	250	252	304
80%	578	464	444	456	296	394	284	296	216	318	494	530	292	274	274	324
90%	622	558	538	560	350	518	300	328	278	440	614	660	316	296	280	424
95%	670	622	638	640	466	622	334	412	308	540	670	708	410	320	286	520
E.P.	690	642	640	676	546	625	438	572	414	590		710	486	398	332	590
REC.																
RES.																
Loss																
R.V.P.	0.0	0.5	1.2	2.8	2.1	1.0	5.6	3.9	9.7	1.3	6.0	0.7	3.4	8.0	8.1	1.7
API Gravity @ 60oF	32.7	39.0	37.9	40.9	34.1	36.0	56.5	50.3	71.6	40.4	40.2	35.9	44.8	58.7	60.8	42.8
Sulfur Wt. %	0.33	0.34	0.24	0.33	0.08	0.13	0.001	0.02	0.001	0.10	0.37	0.51	0.01	0.02	0.001	0.10
Aromatics Vol. %	32.3	48.3	56.6	47.0	82.1	66.8	37.1	45.2	15.6							
Benzene, Wt. %	N/A	N/A	N/A	3.10	34.70	N/A	5.16	2.34	2.10							
Heating Value Gross, BTU/Lb.										19759.4						19870.6

COMMONWEALTH OIL AND REFINING COMPANY
PHASE I: SUBSURFACE OIL INVESTIGATION REPORT

Commonwealth Oil Refining Company
Petrochemical Complex
Penuelas, Puerto Rico 00731

DSM Project No. 1012-01-01

November, 1994

Prepared by:
DSM Environmental Services, Inc.
1830 South Kirkwood, Suite 201-A
Houston, Texas 77077

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Tod C. Heverly

Tod C. Heverly
Chief Geologist

Joe Rafferty
President

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DSM ENVIRONMENTAL SERVICES INC.

November 10, 1994

Mr. Andrew Bellina
Chief, Hazardous Waste Facilities Branch
Jacob K. Javits Federal Building
26 Federal Plaza
New York, NY 10278

RE: **Phase I: Subsurface Oil Investigation Report for Commonwealth Oil Refining Company (CORCO), Petrochemical Complex, Penuales, Puerto Rico 00731**

Dear Mr. Bellina,

DSM Environmental Services, Inc. is pleased to submit the "Phase I: Subsurface Oil Investigation Report" on behalf of CORCO.

The Phase I: Subsurface Oil Investigation report contains the findings and conclusions from the field investigation. The report also contains recommendations and a Time-Line for proposed product recovery at the facility.

If you have any questions, please feel free to contact our office at (713) 870-8676.

Sincerely,
DSM Environmental Services, Inc.

Tod C. H

Tod C. Heverly
Chief Geologist

w/enclosure

TH/sr 1012-p1sub.ltr

cc: Mr. Roberto Berberena - P.R.EQB
Dale Byars - CORCO
Edert Ortiz - CORCO

I. EXECUTIVE SUMMARY

I. EXECUTIVE SUMMARY

This report has been prepared for Commonwealth Oil Refining Company (CORCO Facility) by DSM Environmental Services, Inc. (DSM) for the Phase I: Subsurface Oil Investigation at the CORCO Petrochemical Complex, Penuelas, Puerto Rico. The Environmental Protection Agency Solid Waste Registration Number for the CORCO Penuelas, Puerto Rico Facility is **EPA SW ID# PRD-091017228.**

The Phase I: Subsurface Oil Investigation stems from the 1990 Settlement Agreement between the U.S. EPA and Commonwealth Oil Refining Company. The purpose for the location and placement of soil boring/piezometer wells was to develop a Facility wide information data base to determine the presence of free-phase product.

The Phase I investigation involved drilling thirty-two (32) soil borings fifteen feet into the uppermost aquifer at the site, the installation of thirty-two (32) piezometers and fluid level measurements at the CORCO Facility. Soil samples were collected and submitted to Analytical Laboratory for geotechnical characterization. Free-phase product samples were collected and submitted to a Petroleum Oil Laboratory for product characterization.

This report presents findings from the Soil Boring Program, Fluid Level Measurement Program, descriptions of approaches and procedures utilized in the performance of the subject soil sampling, and groundwater and product characterization at the CORCO Facility.

The boring locations of the Phase I: Subsurface Oil Investigation were based on the site specific lithology as determined by previous subsurface investigations conducted at the CORCO Facility. Previous investigations in these areas were conducted by Versar, Inc. (1986), Roy F. Weston, Inc. (1989), and GDC Engineering, Inc. (1994). The two formations investigated are:

- Quaternary Alluvial Deposits
- Tertiary Ponce Limestone

The Phase I: Subsurface Oil Investigation was initiated in May 1994 to determine the presence and volume of free-phase product at the CORCO Facility. Free-phase product was indicated at a number of wells during the installation of the thirty-two piezometers.

The Tertiary Ponce Limestone deposits are located in the upland regions, at the CORCO Facility, north of Route 127. The Phase I investigation advanced twenty-six (26) piezometer soil borings in the Ponce Limestone deposits to a maximum depth of one hundred and ninety feet below-land-surface (190 ft. bls). The elevation range, for the soil borings, was from 29.56 to 164.25 feet above mean sea level (ft. msl).

approximately one foot. The road is the main route for heavy equipment and traffic in and through the Petrochemical Complex. The presence of this roadway is significant as it appears to impact the geohydrology at the CORCO Facility by causing the potentiometric surface to form a mound at the interface between the Ponce Limestone and the Alluvial Deposits.

The dip, of the Ponce bedding plains, also influences the migration pathways at and to the water table. The 18 to 22° dip of the Ponce Limestone effects the horizontal pathways at the water table. This feature was evidenced at PD-17, PD-18, and PD-25. Small cavities of a soft "calcite gel" four to seven feet in height were encountered at the water table. These cavities are not regarded as phreatic caves because: 1) they were filled with a "calcite gel"; 2) they were only evidenced at PD-17, PD-18 and PD-25; and 3) "heaving sands" are predominant through out the Ponce Limestone.

The cavities found at PD-17 and PD-18 are similar in that they exhibit a four to four and a half foot height, "heaving sands" and required twenty-five sacks of gravel to filter pack the piezometer screen. This may be a single area of very soft "calcite gel". The cavities are most likely a localized solution mechanism of recharge and discharge, but may possibly be a chemical mechanism as these piezometers are confirmed to contained free-phase product.

The Quarternary Alluvial Deposits are located in the low lying regions, at the CORCO Facility, south of Route 127. The Phase I investigation advanced eight (8) piezometer soil borings in the alluvial deposits to a maximum depth of thirty (30) feet below-land-surface. The elevation range, for the soil borings, was from 4.69 to 11.84 feet above msl.

The soil borings drilled in the Alluvial deposits encountered three depositional zones of lithology. The first zone is varying grades of silty clay to silty clayey gravel. This zone appears to be fill material. The fill material originates from the Ponce Limestone and most likely was deposited during construction of the CORCO Tank Farm. The second zone shows facies of diverse compositions of peat to organic silty clays. The third zone shows facies of clay, silt and sands with some gravels.

The aquifer system in both the Quaternary Alluvial Deposits and the Tertiary Ponce Limestone is evidenced to be acting under water table conditions. The aquifer system was consistently encountered at or near mean sea level. The potentiometric surface generally shows a flat gradient flowing southward towards the Guayanilla and Tallaboa Bays.

The potentiometric surface indicates a complex flow pattern at the CORCO Facility. Three directions of flow are evidenced in the Ponce aquifer. The regional flow is south towards the Guayanilla and Tallaboa Bays. The local groundwater gradient in the hydraulic ridge flows from the west to the northeast towards the Tank Farm Central

The twenty-six (26) soil borings drilled in the Ponce Limestone are located north of Route 127. The boring locations are on an east-west trend. The lowest string of soil borings, PD-9 through PD-18, are located south of the process areas. The second string of soil borings are located on the roadway north of the process areas. The third string of soil borings is located south of the MIS Area.

Most of the Ponce Limestone is a yellowish-white chalky limestone. The Ponce Limestone formation often shows good bedding, close packing and good orientation of allochems. The Ponce Limestone is generally massive, but includes some thin dense strata and clay facies and in locations is highly fossiliferous. The compositional diversity, of the Ponce Limestone, ranges from sparry calcite to microcrystalline calcite. The calcite grain size ranged from fine to very coarse (0.03 mm to 2.0 mm) in all Phase I soil borings drilled in the Ponce Limestone.

The dip of the Ponce Limestone and weathering effects have resulted in a relatively horizontal water table that cuts across the bedding plains. The water table in the Ponce Limestone was generally encountered at two to five feet above mean sea level. The formation often showed "heaving sands" at or just below the point of saturation.

It was evidenced during the investigation, that there are natural structural features of the Ponce Limestone that influence the potentiometric surface at the CORCO Facility. These structures are: 1) a perched aquifer at PD-13; 2) a northwest to southeast trending hydraulic ridge; 3) a mounding effect at the interface of the Ponce Limestone and the Alluvial Deposits; and 4) three small cavities.

The Ponce Limestone aquifer was consistently encountered near sea level, except at PD-13. The soil boring PD-13 lithology is typical of the Ponce Limestone, but the saturated zone is an anomaly compared to all other borings in the Ponce Limestone. The saturated zone was encountered at thirteen feet below land surface in PD-13. This saturated zone, at PD-13, is a "perched aquifer" above the normal water table surface. The potentiometric level measurements collected on September 27, 1994, also indicate PD-13 as an outlier. The recharge source for PD-13 has not been identified at this point in time.

A large hydraulic ridge trending northwest to southeast is present at the CORCO Facility. The hydraulic ridge extends from PD-31 to PD-7. The data from piezometer well PD-13 was utilized in constructing the potentiometric surface even though the piezometer is screened in a perched aquifer. None of the wells in the hydraulic ridge had any recordable free-phase product.

The road, Route 127, bisects the CORCO Facility on an east to west bearing. The roadway is built on/at the interface between the Ponce Limestone and Alluvial Deposits. Route 127 is built on the Alluvial flats and follows the contour of the Ponce Limestone hill-sides. The road base has been raised above the surrounding land surface

Area. The local gradient in the Process Area flows from east to northwest direction towards the Tank Farm Central Area. The average gradient in the water table is 2.30 x 10^{-3} ft./ft.

The Ponce aquifer gradient in the Process Area flows may be due to mounding at the interface between the Ponce Limestone and the Alluvial formation. The road base of Route 127 may also be acting as an aquitard in the upper reaches of the water table at the CORCO Facility.

The presence of free-phase product was indicated at a number of wells during drilling the soil borings. The piezometer wells were completed, developed and measured to confirm the presence of free-phase product. The Phase I piezometer wells, MIS Area monitoring wells and the RCRA monitoring wells were measured for static water levels and free-phase product levels on September 27, 1994. The product volume was calculated for five areas of free-phase product at the CORCO Facility. The estimated volume of free-phase product, in the five areas, at the Facility are as follows:

The MIS Area contains 83,551 barrels of free-phase product;
The Tank Farm West Area contains 311,694 barrels of free-phase product;
The Facility South Area contains 26,481 barrels of free-phase product;
The Tank Farm Central Area contains 379,865 barrels of free-phase product; and
The Process Area contains 577,759 barrels of free-phase product.

The total estimated volume of free-phase product, at the CORCO Facility, is 1,379,351 barrels of free-phase product.

The product at the CORCO Facility has been characterized by analyzing material collected during the Phase I: Subsurface Oil Investigation soil boring program. The collected product was submitted to and analyzed by the Puerto Rico Oil Laboratory (PROLAB) at the CORCO Facility. The PROLAB analyses indicate the free-phase product is a mixture of crude petroleum fractions. The product mixture ranges from the light gas fractions to heavier lubricating oils, depending on the sample location. The IBP Distilla'ions show that the majority of the product sampled is a blend of diesel and gasoline. The sample collected from boring PD-4 contained the heavier crude fractions, and therefore indicates a different source area.

CORCO recommends the generation and implementation of a Phase II: Subsurface Oil Recovery Workplan for the Commonwealth Oil Refining Company Facility at Penuelas, Puerto Rico. The proposed workplan will detail the locations for Oil Recovery Systems, Recovery Systems Design, and Recovery Wells design. The Subsurface Oil Recovery Workplan will include engineered specifications for product pump rate, percent product volume reduction calculations, and time required for product volume reduction.

The intent of the Phase II: Subsurface Oil Recovery Workplan is to optimize the recovery of the free-phase product at the CORCO Facility. CORCO believes that properly engineered product recovery systems will remove a greater percent of product in a shorter time period. This will reduce the potential impact to human health and further impact to the environment.

CORCO recommends that hydraulic parameters of the Ponce Limestone water table be modeled following an additional static level measurement of the thirty-two (32) Phase I piezometers, six (6) MIS monitor wells, and eight (8) RCRA monitoring wells. The groundwater modeling will focus on flow pathways and theoretical particle tracking methods.

CORCO recommends the recovery of all recoverable free-phase product at the facility in the least amount of time required for efficient recovery of the product. CORCO is presently installing a free-phase product recovery pump system at the MIS Area for product recovery. This system is expected to go on-line in early November 1994. CORCO believes the collected data from the MIS Area recovery operations should be employed to optimize recovery of product from all other areas containing product at the facility.

The collected MIS Area recovery data will be useful in the design and installation of additional recovery systems for the Ponce Limestone aquifer. CORCO feels that the usage of a numeric computer modeling will augment the present knowledge of the aquifer system at the facility. The modeling procedures will also allow engineering recovery of product in the shortest time frame.

CORCO proposes to use the pump and treat process as it is one of the most common free product recovery technologies used at sites to both contain and recover a free-phase product. The free product pumping technique will involve the manipulation and management of groundwater to remove the free-phase product plume and to adjust groundwater levels to prevent the migration of the free-phase product plume.

II. TEXT

1.0 INTRODUCTION

This report was prepared by DSM Environmental Services, Inc. for the Commonwealth Oil Refining Company Refinery/Terminal Facility (**EPA SW ID# PRD-091017228**), located at the Petrochemical Complex, Penuelas, Puerto Rico (United States of America Commonwealth).

The subsurface investigative work conducted at the site is in compliance with the 1990 Agreement between CORCO and the Environmental Protection Agency (U.S. EPA) Region II. A request from the U.S. EPA, Region II on January 28, 1994 initiated the Phase I: Subsurface Oil Investigation Work Plan (Weston 1990).

In order to characterize conditions at the site, several stages of field activity, laboratory analysis and data evaluation were initiated during the Phase I: Subsurface Oil Investigation. This report presents the data collected in the performance of: soil boring/soil sampling, piezometer well installation, oil sampling, and liquid level measurement programs.

The overall objectives of the on-going Phase I: Subsurface Oil Investigation are:

- to perform field investigation and laboratory tests to ascertain the physical surface and subsurface features;
- to determine the possible presence of free-phase hydrocarbons within the soils and uppermost aquifer and, if found, to evaluate the magnitude and extent thereof;
- to identify and evaluate the factors controlling the transport of hydrocarbons; and
- to identify the appropriate general post-assessment response measures for the site.

Earlier site assessment work discovered the existence of free-phase product on the water table within the fractured matrix of the Ponce Limestone. A previous investigation within the northwest portion of the facility, conducted by Roy F. Weston, Inc. (1989), encountered free-phase product during an Environmental Impact Statement investigation. The study was conducted at the proposed Modular Incineration Systems, Inc. site (MIS) Area, which is located due north of Tank 965 and Tank 956.

As part of the Environmental Impact Statement prepared for the proposed MIS Facility, six (6) bedrock monitoring wells were installed. During the drilling of these wells, hydrocarbon stained soils and odors were reported. A strong hydrocarbon odor with black or brown free-phase product floating on the water was noted in the monitor well

MW-03, MW-04, MW-05, and MW-06. No hydrocarbon odor or product was reported in MW-1 or MW-2.

The free-phase product was noted at the approximate location of the water table. The presence of free-phase product was confirmed and reported to the appropriate regulatory agency. US EPA correspondence of January 28, 1994 requested the recovery of confirmed product at the MIS Area monitoring wells.

The Phase I: Subsurface Oil Investigation was initiated in May 1994 to determine the presence and volume of free-phase product at the CORCO Facility. The Phase I investigation involved the drilling and installation of thirty-two piezometers at the facility. The presence of free-phase product was indicated at a number of wells during the drilling of the soil borings. The piezometer wells were completed, developed and measured to confirm the presence of free-phase product.

1.1 Report Out-Line

The Phase I: Subsurface Oil Investigation Report is organized to consolidate regional and local geo-hydraulic characteristics together in a single document. The report out-line and a brief summery of the section contents is as follows:

Section 2.0 - Site Description and Abatement measures

The CORCO Facility has been reviewed as to the location of all petrochemical units and companies in the lower Tallaboa Valley. The current and historic operating status of the units is briefly addressed. The method and discovery of free-phase product at the CORCO Facility is examined. The status of current abatement measures at the MIS Area are reported.

Section 3.0 - Site Characterization

The regional physiography at the CORCO Facility is addressed. The regional geology and hydrology is reviewed referencing published USGS Reports. The potential receptors from subsurface pathways are reviewed using findings from previous assessments and current data.

Section - 4.0 Soil Assessment

This section addresses the soil boring methodologies and site specific findings of the Phase I: Subsurface Oil Investigation soil boring program. The section is a environmental geologic study of the CORCO Facility based on recommended procedures and reporting methods from the RCRA Ground-Water Draft Technical Guidance Document (U.S. EPA, 1992).

Section - 5.0 Groundwater Assessment

The groundwater assessment section addresses the field investigation methodologies and the site specific geohydrology findings at the CORCO Facility. The section is a environmental geohydraulic study of the CORCO Facility based on recommended procedures and reporting methods from the RCRA Ground-Water Draft Technical Guidance Document (U.S. EPA, 1992) and the Draft Technical Enforcement Guidance Document (U.S. EPA, 1992).

Conclusions and Recommendations

The conclusions summarizes the geohydraulic findings and estimated product volume at the CORCO Facility. The recommendations are based on the current site specific data. These recommendations may have to be modified as additional data is collected.

2.0 SITE DESCRIPTION AND ABATEMENT MEASURES

The on-going subsurface investigatory activities are generating data that will be used in the evaluation of remedial alternatives as part of on-going corrective measures at the site. The Phase I: Subsurface Oil Investigation activities generated data necessary for the location, design, and feasibility of appropriate oil recovery systems. The on-going investigative activities will define the field activities required for final design parameters for oil recovery at the site.

2.1 Site Description

The CORCO Refinery/Terminal is located in the south-central coast of Puerto Rico (see **Figure 1, Site Location Map**). Further definition of the site location is as follows:

- The property consists of a hydrocarbon products storage facility and terminal which occupies approximately eight hundred acres of land straddling the boundary between Municipio de Guayanilla to the west and Municipio de Penuelas to the east. The facility has a topographic relief of approximately 280 feet. One-third of the facility is situated in the Lower Tallaboa Valley, which has an elevation range of 0 to 26 feet above sea level. Two-thirds of the facility is situated on the southeastern edge of the upland ridge that separates the Guayanilla and Tallaboa River Valleys.

The south central coast is the most arid region of the Island. The hills and ridges are typically steep, with low-lying river valleys running southward from the Cordillera Central to the Caribbean Sea. Development is typically restricted to the coastal alluvial fans, coastal plains, plateaus, and inland river valleys.

The land adjacent to the terminal is used for industrial, small business, and residential purposes. Cottage industries are practiced at some of the residential areas. The industrial activities immediately adjacent to the CORCO Site are carried on to the east, south, and west. The site is bounded by Puerto Rico Route 2 to the north, Gulfchem to the east, Puerto Rico Electrical Power Authority (PREPA) and Shell Company to the west, and Union Carbide to the south. The Union Carbide Facility separates the Eastern and Western Lagoon Areas (see **Figure 2**, Site Facility Map).

A number of the industries in the petrochemical complex area have discontinued petrochemical and refining operations. PREPA continues to operate as an electrical generating station.

2.2 Site Facilities

The CORCO Facility was formed in 1953 and operated as an independent petroleum refiner and petrochemical manufacturer in the Commonwealth of Puerto Rico. CORCO Facility historically operated as a petroleum refining and petrochemical manufacturing plant. All petrochemical operations were suspended in November 1981 and all refining operations ceased in March 1982. CORCO continues to operate part of its facilities as a products storage facility and terminal. At present, CORCO is leasing tank storage to other companies for product storage.

When in complete operation, the CORCO complex was divided into several units or areas (Versar, 1986). These units included:

- Refinery Unit No. 1
- Refinery Unit No. 2
- Refinery Unit No. 3
- Petrochemical Unit No. 1
- Petrochemical Unit No. 2
- Caribe Isoprene Corporation (CIC)
- OXOCHEM Enterprises, Inc.
- Olefins Plant
- HERCOR Chemical Plant
- Docking Areas

During production, each refinery operated two crude oil distillation units, a vacuum distillation unit for crude bottoms, a Hydroflow catalytic cracker unit, a Visbreaker unit, a hydrotreater unit, a catalytic polymerization unit, and a sulphur recover unit (GCA, 1985). Products of the refinery included gasoline, naphtha distillates, wet gases, propane, butane, and fuel oil. At present time, all production operations are idle.

The petrochemical plants (CPI No. 1 and CPI No. 2) received part of their feed stock from the refinery complex. These feedstocks, heavy and light naphthas, coupled with purchased naphtha were used to produce liquified petroleum gas (LPG), butane, cyclohexane, benzene, toluene, and mixed xylenes (ortho-xylenes, meta-xylenes, and paraxylenes). The petrochemical complex ceased operations in November of 1981. In 1987, both plants were sold to Arochem International.

The acid plant produced sulfuric acid that was used as a catalyst in the alkylation unit. Sulfuric acid was also sold as a product. The raw material for the plant was spent sulfuric acid from the alkylation unit and recovered hydrogen sulfide from the refinery process. The acid plant ceased operations when the refinery ceased operations.

Caribe Isoprene Corporation (CIC) was a joint venture with Mitsubishi and Nippon Zeon Corporations to produce isoprene, which is used in rubber production. CIC ceased operations in 1981. CORCO currently owns the CIC property.

The OXOCHEM Plant produced oxo-alcohols. The raw material (propylene) for this plant was obtained from both the Olefins Plant and CORCO. Final products included 2-ethylhexanol, isobutanol, and butanol. The alcohols were used as raw materials for phthalate plasticizers. The plant was a joint venture with GRACE Corporation. The plant was closed in 1978.

The Olefins Plant was a joint venture with PPG Company. The plant produced propylene for the OXOCHEM Facility. The Olefins Plant closed in 1978. CORCO does not own the property occupied by the Olefins Facility. However, CORCO owns two tanks and ancillary facilities, including real estate, that were originally owned and operated by Puerto Rico Olefins (PRO).

The HERCOR Chemical Plant was jointly owned by CORCO and Hercules Chemical Corporation until 1981. In 1981, CORCO withdrew from the HERCOR operations and the chemical plant became the property of HERCOR Chemical. The plant received feedstock from the petrochemical complex and produced paraxylenes. CORCO does not own the property occupied by the HERCOR Chemical Plant.

CORCO has operated docking facilities on Tallaboa Bay and Guayanilla Bay. The Tallaboa dock was leased from the Puerto Rico Port Authority and is no longer under the lease agreement, but is still utilized by CORCO. The Guayanilla Bay dock, which is owned by CORCO, was used for the loading and unloading of refinery, petrochemical, and propylene products. The dock is still used for the loading/unloading of diesel, LPG, jet fuel, and gasoline.

A separate business consortium proposed to build a modular incineration system at the CORCO Facility. The construction site was prepared in the northwest portion of the CORCO Facility on the hillside above the refinery. The site was leveled by cutting into the hillside and back-filling along the margins. The modular incineration system was not constructed.

The CORCO Tank Farm is for the storage of hydrocarbon products. The largest portion of the Tank Farm is located north of Route 127 and is situated on the Ponce Limestone. A number of tanks (8) are located to the south of Route 127 on the Quaternary Alluvium. The tanks north of Route 127 on the Ponce Limestone, have been cut into the hillside and back filled with caliche along the margins. The elevation of the Tank Farm, north of Route 127, ranges from 35 to 280 feet above msl. The elevation of the Tank Farm, south of Route 127, ranges from 8 to 20 feet above msl.

2.3 Description of Release

Earlier site assessment work discovered the existence of free-phase product on the water table within the fractured matrix of the Ponce Limestone. A previous investigation within the northwest portion of the facility, conducted by Roy F. Weston, Inc. (1989), encountered free-phase product during an Environmental Impact Statement investigation. The study was conducted at the proposed Modular Incineration Systems, Inc. site (MIS) Area, which is located due north of Tank 965 and Tank 956.

As part of the Environmental Impact Statement prepared for the proposed MIS Facility, six (6) bedrock monitoring wells were installed. During the drilling of these wells, hydrocarbon stained soils and odors were reported. In monitoring well MW-3, free-phase product was noted at a depth of one hundred and seventy five feet below land surface (175 ft. bls), at the approximate location of the water table. A strong hydrocarbon with black or brown free-phase product floating on the water was noted in the log for monitor well MW-4. In monitor well MW-5, a hydrocarbon odor was noted but no visible hydrocarbon was detected. Strong hydrocarbon odor was reported in monitor well MW-6. No hydrocarbon odor or product was reported in MW-1 or MW-2. The presence of free-phase product was confirmed and reported to the appropriate regulatory agency. US EPA correspondence of January 28, 1994 requested recovery of product confirmed at the MIS Area monitoring wells.

During a site visit in March of 1994, free-phase product levels were measured in the monitoring wells at the MIS area. The results of these measurements are presented in **Table 1**. Four (4) of the six (6) MIS monitoring wells contained significant thickness of free-phase product. Monitoring wells MW-1 and MW-2 contained no product. The measured static water levels, in MW-1 and MW-2, showed that the water levels were above the screened interval and free-phase product floating on the water table could not enter these wells. The measured thickness of free-phase product, March of 1994, ranges from 6.74 to 9.30 feet in monitoring wells MW-3 through MW-6.

2.4 Abatement Measures

CORCO submitted, on April 15, 1994, "Product Recovery Work Plan for the M.I.S. Area, COMMONWEALTH OIL REFINING COMPANY, INC." to the US EPA, Region 2. The product recovery work plan was approved and initiated in July, 1994. The product recovery system consists of four (4) product recovery pumps installed in the MIS Area monitoring wells where the presence of free-phase product has been confirmed. The product recovery pumps will be installed in MW-03, MW-04, MW-05, and MW-06, which have a significant level of confirmed free-phase product. The MIS Area recovery system includes an air compressor, four (4) downhole pneumatic pumps, Water Production Prevention system, and an above ground storage/staging tank.

The downhole pneumatic pumps operate on a cyclic principle with the duration of the discharge and refill cycles determined by a Main Pump Controller. The cyclic discharge and recharge of the compressed air is the operating mechanism that actuates product production from the pumps. The discharge occurs when a compressed air charge is delivered to the pump, which causes the air intake check balls to seat while simultaneously forcing collected product through the discharge tubing. The refill cycle occurs when the compressed air charge is removed, which allows the pump to refill with product. The pressurized air vents from the pump, through the discharge tubing, moving recovered product to the above ground storage/staging tank.

The pumps operate on cycles, which are controlled by a pneumatic timing circuit. The multiple pumps are operated from one Main Pump Control by use of Satellite Controls. A satellite control is placed at each well head, with two air line connections. One air line connection supplies "operating air" to the pump and the other air line connection is the "logic" tubing from the main control manifold. The rate and duration of the discharge and refill cycles are determined at the main control manifold. The "logic" signal, sent from the main control, actuates a valve on the satellite control and allows "operating air" to flow to the pump. Attached to the satellite control is a level sensing tubing that extends down the well to the liquid level. The "logic" signal from the main pump control is blocked until there is enough fluid in the well to submerse the end of the level sensing tubing. This prevents the operation of individual pumps in low product level conditions, without shutting down the recovery system.

The water production prevention systems include a Conductivity Control System and a Water-In-Oil sensor. The Conductivity Control System consists of a conductivity probe placed downhole, below the liquid intake level, of each operating pump. On detection of water, the Conductivity Control actuates a solenoid valve that blocks the "operating air" flow to the specific pump. This allows the recover system to continue operation, even if one or more pumps are down due to slow recovery. The second water production prevention system is an Water-In-Oil sensor. The sensor is located downstream of the product discharge manifold. When a product with a total concentration of 0.1% H_2O is detected, the controller sends a signal to the Air Solenoid Controller which blocks the air supply to the Main Pump Control. This shuts down the recovery system. The Water-In-Oil sensor is equipped with a latching relay that allows the system to be manually operated in an over-ride mode for pumping water contaminated oil to treatment or storage. The recovered product will be recycled, blended and stored for sale. All storage/staging tanks are equipped with high-level pump shut down devices to prevent possible overfill.

The product recovery system was expected to go on-line October 15, 1994. The recovery system start-up has been postponed due to possible lateral downhole movement of a clay formation. The pneumatic recovery pumps (1¾ x 56 inches) could not be correctly positioned at the proper depth below land surface, as the pumps bound inter-casing at 40 ft. bls. This depth approximates the location of a clay facie that is known to cause slump and mass wastage within the Ponce Limestone. The well casings has been scheduled, as of October 14, 1994, to be tested using a inter-casing caliper to determine if pumps with a shorter length can be positioned correctly within the product. The pneumatic pump manufacture was notified and requested to engineer a smaller pump (1⅝ x 36 inches). These pumps will be constructed if the caliper testing indicates the wells are viable as recovery wells. At present, the recovery system is expected to be on-line in early November 1994.

3.0 SITE CHARACTERIZATION

3.1 Site Physiography

Puerto Rico is the most easterly and smallest of the four major islands that form the Greater Antilles. The other three land masses within the Greater Antilles island cluster include Cuba, Jamaica, and Hispaniola. Puerto Rico is surrounded by the Atlantic Ocean to the north and the Caribbean Sea to the south. The Islands most noteworthy geological feature is the Cordillera. A chain of towering mountains that rise above the Central Region. The mountain summits are the high parts of a chain that's mass is buried mostly beneath the sea. The mountain peaks are the result of volcanic actively that deposited lava and igneous rock in consecutive layers. To a lesser degree, the island is composed of quartz, diomites, and along some of the edges, coral limestone.

The daily temperatures in Puerto Rico average in the mid-70's and seldom go above 85 degrees or below 70 degrees. Most rain falls in May but there is no definite rainy season. The sun shines most days of the year. The CORCO Facility is located on the Caribbean Island of Puerto Rico. The facility is situated south of the Central Cordillera Mountains in the southwest region. The CORCO Facility is near Ponce, which is the second largest city in Puerto Rico.

3.2 Regional Geology and Hydrogeology

The CORCO Facility is located in the Tallaboa-Guayanilla-Guanica subarea of the south coast region of Puerto Rico (USGS, 1987). The three formations in the Tallaboa-Guayanilla-Guanica subarea are Quarternary Alluvium, and the Tertiary Limestones which are made up of the Ponce Limestone and Juana Diaz Limestone. Thick deposits of unconsolidated Quarternary Alluvial of boulders, gravel, sands, silts and clays underlie large portions of the Tallaboa Valley. These alternating alluvial sequences grade southward towards the Caribbean Sea to finer-grained deposits of lacustrine origin. The Quarternary lacustrine deposit composition is generally fine-grained sequences of sand, silts, clays and peat. Further southward towards the Caribbean Sea, the benthoic deposits are generally thin re-worked beach deposits of quartz sand and calcite reef rubble. The

Quarternary deposits thicken seaward and are underlain by the Tertiary Limestone formations. The Quaternary Alluvial Deposits are underlain by the Tertiary Ponce Limestone in the south and by the older Tertiary Juana Diaz Limestone to the north.

The Ponce Limestone is the bedrock of concern in the area of the CORCO Facility. The Ponce Limestone is comprised of an upper Miocene member and a lower Oligocene member with a total thickness of 2,260 feet. Tallaboa Valley Basin is underlain by the Ponce Limestone. Most of the Ponce Limestone is a yellowish-white chalky limestone. The Ponce Limestone is generally massive, but includes some thin dense strata and clay facies. The formation is commonly fossiliferous (USGS, 1972). The limestone strikes east-west and dips south at an angle of ten to twenty degrees. The Ponce Limestone at the CORCO Facility trends 86 to 94 degrees east and dips 18 to 22 degrees south.

The principle water bearing units underlying the study site are the unconsolidated Alluvial Deposits and the Ponce Limestone. Based on test borings, monitor well and piezometer installation programs, the Ponce Limestone is the aquifer of concern for the free-product recovery program.

The regional hydrogeology discussion is based primarily on the U.S. Geological Survey report on the water resources of the Tallaboa Valley by Grossman et. al. (1972). Unconsolidated deposits of sand and gravel, in the central portion of the valley, are by far the most productive water-bearing material in the Tallaboa Valley region. The Ponce Limestone may serve as a supplemental source of water to wells tapping the overlying sand and gravel. Wells in the Quarternary Alluvial have the highest specific capacity and yield. The maximum yield is reported at 1,200 gpm (USGS, 1972). The average yield of forty nine (49) wells tapping the sand and gravel aquifer is about 260 gallons per minute (gpm), with individual wells yielding upwards to 1,650 gpm. In spite of the low yield and a wide range in chemical quality of groundwater, the Ponce Limestone is the only productive bedrock in the area and is second only to the unconsolidated sand and gravel as a source of water. The average yield of four wells tapping this rock is 30 gpm, the maximum yield being 100 gpm. Salt water intrusion in the alluvium is common near the sea and inland in heavily pumped supply wells. The Beach and dune deposits commonly contain salt water.

Saltwater intrusion from the sea was reported as early as 1961 to be affecting wells south of Route 127. Further studies by the USGS in 1966 showed many wells in this area reporting increased chloride concentrations, the predominant anion of sea water (USGS, 1972). The fresh water supplies for potable and industrial use are obtained from well fields owned and operated by the industries or by the Puerto Rico Aqueduct Authority. The Puerto Rico Aqueduct Authority public potable water is partially supplied from the Grazas Dam, the Yauco Reservoir, and a well field. The well field is located north of Highway 2, in the north Tallaboa Valley, and is completed in the alluvial gravel and sand aquifer. Saltwater intrusion, has shut down most potable water wells in the Tallaboa Valley Region south of Route 127.

Groundwater exists under water table conditions within the alluvial deposits and in the upper part of the Ponce Limestone beneath the valleys (Weston, 1992). The groundwater of the Tallaboa Valley Alluvial deposits occurs under water table conditions with a gradient to the south towards the Bahia de Tallaboa. Groundwater recharge is due to infiltration/percolation. The fractured limestone recharges from the alluvial sands and gravel in the central valley region. The upland region is not favorable to recharge as the limestone is more competent with fewer joints and fractures. The yields in the upland regions of the Ponce Limestone is generally low with high concentrations of dissolved solids. The Juana Diaz Formation may supply small yields of water in the valley, but is of poor chemical quality with a high content of chloride and sulfate (USGS, 1972).

3.3 Potential Receptors

The potential migration pathways investigated are subsurface soil and groundwater. The focus of this section deals with the avenues of potential migration.

Groundwater in the vicinity of the CORCO Facility occurs under water table conditions. The regional groundwater flow direction is towards Guayanilla Bay and Tallaboa Bay. This is a south to southwest flow direction. The local groundwater flow direction in the Tank Farm is west to northeast and east to northwest towards the Tank Farm Central Area.

The groundwater flow direction in the vicinity of the Eastern lagoon Area is to the southeast and towards Tallaboa Bay. The Tallaboa River, located approximately 1,200 feet to the west of the Eastern Lagoon Area, is likely to have little or no effect on the groundwater flow direction in the area of the Eastern Lagoon Area.

Route 127 appears to act as a possible hydraulic barrier (Ref. Lithology Section) at the CORCO Facility. The water table appears to mound up adjacent to the roadway. The construction of the road base for Route 127, along with heavy traffic, may have compacted the upper soils at the water table forming an aquitard. If this is the case, then Route 127 acts as a hydraulic barrier between the Ponce Limestone and the Alluvial Deposits and would confine LNAPL's to the Ponce Limestone. This phenomenon needs to be further investigated during subsequent product level measurement events.

The background water quality has been assessed in the northwest portion of the CORCO Facility at the MIS Area. The water quality was assessed during the MIS Environmental Impact Statement (Weston, 1989). Based on laboratory analysis of the MIS Area groundwater samples, the groundwater is considered to be of poor quality for both drinking water and industrial usage. Chloride concentrations, in all MIS Area wells (MW-1 through MW-6), were above the Federal drinking water standards of 250 mg/ℓ. The chloride concentrations ranges from 523 mg/ℓ in MW-1 to 2,820 mg/ℓ in MW-4.

4.0 SOIL ASSESSMENT

4.1 Soil Boring Program

The soil boring locations at the CORCO Facility were based on probable avenues of migration. In this way, a suitable number of soil borings serve to characterize potential pathways for contamination migration, the magnitude of contamination within the soil matrix, and the aerial extent of free-phase product on the water table. Additionally the soil boring investigation assess possible migration pathways that may exist between the Ponce Limestone and the alluvial deposits. The Phase I: Subsurface Oil Investigation soil borings were converted into piezometer wells to aid in determining the extent of free-phase product and possible migration pathways.

Before drilling activities began, the location of all soil borings/piezometer wells were staked by the on-site DSM geologist. The locations were approved by a CORCO representative for CORCO utilities, to ensure that underground pipelines, underground cables, water pipes or other potentially dangerous features were not encountered.

A total of five (5) soil borings/piezometer wells were moved from the proposed locations as delineated in the Phase I: Subsurface Oil Investigation Work Plan (WESTON, 8/30/90). Boring locations were adjusted based on site access, property boundaries, and surface obstructions. The soil borings/piezometer wells were relocated as per verbal directive from Mr. Tim Gordon during a May 11, 1994 Site visit (refer to **Figure 3, Soil Boring Location Map**).

The authorized relocated soil borings/piezometer wells are as follows:

PD-1, PD-2	Equally spaced on the Causeway to CORCO Docks flanking Tank 1007;
PD-18	West of the CORCO Laboratory at the extent of CORCO property;
PD-22	North West corner of CPI-1, due North of Tank 739; and
PD-26	North of the Refinery Plant II, due North of the boiler office.

The bore-holes were advanced using a Hollow-Stem Auger Drilling Rig. The soil borings were installed using a trailer mounted Acker and CME-55 drilling rigs capable of advancing a 6.25-inch outside diameter (O.D.) hollow stem auger to a predetermined depth as defined in the Soil Boring Plan. Soil borings were sampled from the ground surface to a termination depth (TD) approximately fifteen (15) feet below the water table using a split-spoon sampler. Split-spoon samples were collected at 5-foot intervals or at smaller intervals during changes in subsurface lithology or when a water horizon was encountered. This drilling methodology was used for all 32 soil borings in both the Alluvial Deposits and the Ponce Limestone.

A 2-foot split-spoon sampler was utilized because poor sample recovery was encountered when drilling in both the alluvial Deposits and the Ponce Limestone. Poor sample recovery occurred in facies of course-grained and/or saturated granular sediments and in zones of high density - hard to compact bedrock. Standard penetration tests were preformed when using the split-spoon sampler in the course-grained, noncohesive, and saturated granular sediments in conformance with ASTM D-1586. This in-field physical properties testing technique was used to quantify the relative density of the noncohesive and cohesive facies.

The sampling tools utilized in the investigation were decontaminated between collection of individual samples. All downhole equipment and the drilling rig was decontaminated prior to initiating the drilling of a soil boring. The sampling tools, drill rig, and downhole equipment were decontaminated using a high-pressure, hot water steam cleaner and a high-pressure potable water rinse. Those items for steam cleaning would include drill pipe, hollow-stem auger flights, drill bits, tremie pipe, and down hole sampling devices.

At the soil boring site, the sampling equipment was decontaminated between samples using first a washing and scrubbing in a mild laboratory detergent (Liquinox ©), followed by a potable water rinse, and then a final rinse using deionized water. The on-site decontamination procedures were used on sampling devices such as split spoons, Shelby tubes, as well as sample trays and stainless steel trowels and knives.

4.1.1 Soil Boring Location

The boring locations of the Phase I: Subsurface Oil Investigation were based on the site specific lithology as determined by previous subsurface investigations conducted at the CORCO Facility. Previous investigations in these areas were conducted by Versar, Inc. (1986), Roy F. Weston, Inc. (1989), and GDC Engineering, Inc. (1994). The two formations investigated are as follows:

- Alluvial Deposits
- Ponce Limestone

The Phase I: Subsurface Oil Investigation is in compliance with the 1990 Settlement Agreement between CORCO and the U.S. EPA. The purpose for the location and placement of soil boring/piezometer wells was to develop a facility wide information data base to determine the presence of free-phase product.

Eight (8) soil borings were drilled in the Alluvial deposits between the Eastern Lagoon Area and the Western Lagoon Area at CORCO's southern property boundary. Eight monitoring wells (EL-1 through EL-4 and WL-1 through WL-4) had been drilled by GDC Engineering, Inc. (1994) in a previous investigation in the Alluvial Deposits.

The eight soil borings drilled in the Alluvial deposits are located south of Route 127. The soil boring PD-1 is situated at the northwest corner of Tank 1007's berm. The remaining seven (7) soil borings in the Alluvial Deposits, PD-2 through PD-8, are located on a west to east line approximately equal-distance between each other. The borings PD-3 through PD-8 are located at the southern extent of CORCO property.

Twenty-six (26) soil borings were drilled in the Ponce Limestone. These borings were placed in three strings on an west to east orientation to the extent of CORCO property. The strings were placed within three approximate ranges of elevations at 40 to 55 msl, 90 to 105 msl, and 145 to 190 msl. A previous investigation within the northwest portion of the facility, conducted by Roy F. Weston, Inc. (1989), encountered free-phase product during an Environmental Impact Study. This study was conducted at the proposed Modular Incineration Systems, Inc. site (M.I.S. Area), which is located due north of Tank 965 and Tank 956. The elevations of the MIS Area monitoring wells ranges from approximately 170 ft. bls to greater than 200 ft. bls.

The twenty-six (26) soil borings drilled in the Ponce Limestone are located north of Route 127. The lowest string of soil borings, PD-9 through PD-18, are located south of the process areas at two elevation ranges of approximately 45 to 55 ft. msl and 90 to 105 ft. msl. These borings are spaced equal-distance, on an west to east bearing, from southwest of Tank 1011 to due east of PROLAB. The second string of soil borings, PD-23, PD-24, PD-19, PD-20, PD-21, PD-27, PD-28, PD-29, and PD-22, are located on the roadway north of the process areas. The second string of borings is at two elevation ranges of approximately 90 to 105 ft. msl and 145 to 190 ft. msl. These borings are spaced equal-distance, on a west to east bearing, from due west of Tank 965 to due north of C.P.I. 1. The third string of soil borings, PD-30, PD-31, PD-32, PD-25, and PD-26, at two elevation ranges of approximately 90 to 105 ft. msl and 145 to 190 ft. msl. These borings are spaced equal distance, on a west to east bearing, from due west of Tank 955 to south east of Tank 973. The third string of soil borings is located south of the MIS Area.

All thirty two (32) soil borings/piezometer well installations were advanced to the uppermost aquifer. The soil borings were terminated a minimum of 15 feet into the water table. Occasionally the boring was drilled further into the formation when a "heaving sand" was encountered. The additional footage drilled was deemed necessary in order to set a piezometer well without impacting the formation. The soil borings were expected to encounter the saturated zone between 5 to 15 feet above mean sea level (msl) in both formations as the uppermost aquifer at the facility is acting under water table conditions.

4.1.2 Sample Selection

Soil samples were collected in advance of the hollow stem drilling augers with a split-spoon sampler to ensure that the samples were collected from undisturbed soils. When a soil sample had been collected, it was brought to the surface and removed from the downhole split-spoon sampler. The soil samples were collected from the cores using dedicated or decontaminated sampling tools at regular 5 foot depth intervals. If sandy unconsolidated, noncohesive samples were retrieved, the sample was carefully scooped into glass sample containers using a stainless steel spoon. The collected soil core and bedrock samples were placed into glass sample containers for delivery for analytical laboratory analyses.

All collected soil samples were logged in the field by a qualified DSM professional in geology. Selected sample intervals were tested and described in the field using the Unified Soil Classification System (USCS). DSM drilling logs and field records include discussions of the lithographic characteristics encountered according to the USCS descriptive methodology (refer to **Figure 4**). The USCS soil description defines the soil types within a specific format describing structure, texture, mineral composition, moisture content, color and name. The USCS soil description also notes any evidence or odors indicating hydrocarbon contamination.

A portion of each collected sample was placed in a sample screening container and the head space scanned with an Organic Vapor Analyzer (OVA). The make and model of the OVA used during the investigation was a Microtip HL-2000 Photovac ©. The OVA was calibrated, at a minimum of once a day, with a span gas of 100 parts per million (ppm) isobuytlene for the detection of light end hydrocarbons.

Field screening of boring samples for volatile organics was performed by taking a representative sample from the full length of each core sample and sealing it in an air tight plastic bag of approximately 500 ml capacity. After the sample had been allowed to equilibrate for at least 5 minutes, the bag was pierced with the probe of an OVA. The headspace gas was allowed to enter the photoionization detector of the OVA to obtain a reading of the maximum volatile organic constituents. The soil classification and vapor analyses record of the detected hydrocarbon result was recorded on the Field Boring Log. The OVA results from the soil borings was recorded as parts per million (ppm) and at the representative depth below-land-surface (bls) the sample was retrieved.

The Field Boring Logs were reviewed following completion of the Phase I: Subsurface Oil Investigation. The Field Boring Logs contained: piezometer completion data, sample number, sample depth, blow-counts, percent recovery, USCS sample description, and sample type. A total of five hundred and fifty (550) samples were collected during the investigation. All samples were submitted to an analytical laboratory for visual-manual description and USCS classification.

4.1.3 Soil Boring Geotechnical Results

The five hundred and fifty (550) soil samples collected during the investigation were reviewed with respect to both the Phase I: Subsurface Oil Investigation, and the M.I.S. Area Product Recovery Project. All five hundred and fifty (550) collected soil samples were analyzed by a Geotechnical Laboratory for Visual-Manual Description, and USCS Classification. A group of two-hundred and seventy (270) soil samples were selected to be analyzed for Grain Size, Plasticity Index and Moisture Content. These samples were selected for laboratory analysis based on the need to gather facility wide geo-technical data for free-phase product recovery. This information was judged to be essential for a cognizance understanding of the subsurface conditions at the facility.

The two hundred and seventy (270) collected soil samples have been categorized by piezometer number, sample number, and the depth below-ground-surface for the samples to be analyzed for Grain Size, Plasticity Index and Moisture Content (refer to **Table 2, Collected Soil Samples Sent to an Analytical Laboratory**).

The collected soil samples were sent to an analytical laboratory for analysis of Grain Size, Plasticity Index and Moisture Content to obtain: 1) independent non-bias conformation of the facies; 2) in-situ physical characterization; and 3) analytical laboratory characterization. The Field Boring Logs indicated that the Ponce Limestone and the Alluvial Deposits formations are heterogeneous.

The samples analyzed were selected from facies encountered in the Phase I: Subsurface Oil Investigation that may influence product transportation, product migration, and product recovery. The facies that are greater than twenty (20) feet thick had multiple samples analyzed in order to get an analytical range across the facie. The facies were determined in the field by visual-manual classification methods. The field description indicated that the formations are heterogeneous. The categorized samples were then sent to an analytical laboratory for laboratory characterization.

The characterization of the soil samples will aid in optimizing product recovery at the CORCO Facility. The analytical data will be used to model the subsurface in order to determine optimal recovery methods and time necessary to recover the product on the water table.

A measurement of particle size distribution has been made for the facies analyzed by the laboratory. The methodology for measurement of particle size distribution was a sieve/hydrometer analysis according to ASTM 63 D422 (rev. 1990). The particle size gives an estimate of the hydraulic conductivity of the soil and an assessment of the sorptive capacity of the soil.

The laboratory Atterburg Test (ASTM D4318 rev. 1993) was completed on the samples. These test results will aid in optimizing free-phase product recovery at the facility.

Atterburg Tests have been preformed on facies in the Ponce Limestone. The plasticity and type of fine-grained soil is identified by placement on the Plasticity Chart.

Field estimation of plasticity was accomplished by the repeated act of deforming and remolding a small lump of soil. The methods of performing the field plasticity evaluation was the worm-test. In the worm-test, a small lump of the soil (approximately 0.5 inches by 0.5 inches) was removed from the core. The lump of soil was first saturated (water was added if not naturally saturated), then rolled back and forth between the palms and hand until a "worm" of approximately 1/8 inch in diameter was formed. The sample was determined to be at its plastic limit when the worm breaks upon being rolled. The sample was then remolded into a lump, and the process (without adding additional water) was repeated. The field plasticity description was based upon the number of times the process can be repeated as follows:

Field Plasticity Determination (Worm Test)

Nonplastic	1/8 inch worm cannot be rolled at any water content.
Low Plasticity	1/8 inch worm can barely be rolled and lump cannot be formed after reaching plastic limit one time.
Moderate Plasticity	1/8 inch worm is easy to roll and form but lump cannot be formed after reaching plastic limit one to three times.
High Plasticity	1/8 inch worm can be rolled and reformed numerous times.

The moisture content of a soil was determined in the field by visual-manual methodology. The description is important in understanding an aquifers characteristics and possible reactions to recovery system stresses. Great care was taken when determining the point of saturation and the thickness of any capillary fringe. The moisture content was determined in the Atterburg Test (ASTM D4318) for the submitted soil samples.

Partially saturated soils were described as being dry, damp, or moist with increasing degrees of saturation. When a sample was seen to be saturated it was recorded on the Field Boring Logs at the depth the soil became saturated and of the depth at which the soil ceased to being saturated. The degree of saturation was determined in the field using the following visual methods:

Field Moisture Content Determination

Dry	Absence of moisture, dusty, dry to the touch.
Damp	Sufficient moisture to hold particles together but not sufficient to smear fines when rubbed.
Moist	Sufficient moisture to hold particles together and to smear fines when rubbed.

Saturated	Sample has free water. Visible water forms at sample surface when struck repeatedly with the flat edge of a sampling knife.

The relative density of a noncohesive soil or slightly cohesive soil was determined by recording an "N-value" from the hammer blows used to advance the split-spoon sampler. The split-spoon sample was collected by advancing an 18 inch long by 1 inch ID sampler with repeated 30 inch free-fall drops of a 140 pounds hammer. The sampler was placed on the bottom of the borehole, and six inch increments are marked off on the drill stem from a fixed referenced (the top of the augers). The hammer was then used to advance the sampler (as indicated above), and the number of blows required to drive each 6-inch interval were recorded on the Field Boring Logs. For the protection of the sample tool, no more than 50 blows are used during any single 6-inch advance.

4.1.4 Piezometer Well Installation

The Phase I: Subsurface Oil Investigation soil borings were converted into two-inch piezometer wells in order to monitor the uppermost aquifer at the CORCO Facility. The piezometer wells were completed in accordance with the US EPA approved Weston Phase I: Subsurface Oil Investigation Work Plan. The piezometer configuration was installed to determine the potentiometric surface at the CORCO Facility.

The drilling subcontractor mobilized to the CORCO Facility on May 10, 1994 and commenced drilling on May 12, 1994. The drilling rig mobilized to the site in May 1994 was an trailer mounted Acker capable of drilling 6 ⅝ inch OD Hollow Stem augers. A second drilling rig, a trailer mounted CME-55, was mobilized to the CORCO Facility on June 22, 1994. The installation of all thirty-two (32) piezometers was completed on July 22, 1994 (ref. **Table 3**). The construction of all thirty-two (32) piezometer pads was completed August 17, 1994.

The bore-holes were advanced using a Hollow-Stem Auger Drilling Rig. Split-spoon samples were collected at 5-foot intervals or at smaller intervals during changes in subsurface lithology or when a water horizon was encountered. This drilling methodology was used for all 32 soil borings in both the Alluvial Deposits and the Ponce Limestone. When the soil sampling and logging was complete, the bore hole was reamed to remove any material that may have slough off downhole. The hollow stem augers were then removed from the bore hole and the piezometer well was installed inter-bore. Each piezometer well was constructed of 2-inch, Schedule 40, flush threaded, PVC monitoring well casing. No joint compound was used to seal the PVC threads. The screen sections were 20 feet factory lengths of PVC "wire wrapped" slotted screen as approved in the Work Plan. The added strength of the PVC "wire wrapped" screen was determined to be necessary due to the downhole pressures. Five feet of screen was positioned above the saturated zone with the remaining fifteen feet of screen set below the water table.

At boring locations in the Quarternary Alluvial and the Ponce Limestone, a "heaving sand" was encountered. In such instances, the borehole was usually drilled an additional five (5) feet and a five foot section of blank casing added to the bottom of the screen. This allowed for formation collapse and "heaving sand" to occur while screening the proper zone and placing the filter pack from the bottom of the screen to a minimum of two feet above the screened interval.

Once the well screen and casing were positioned inside the borehole, a clean gravel filter pack was introduced into the annulus. The filter pack was brought up to a depth of approximately two feet above the screened interval. A weighted measuring tape was used to measure the settling depth of the well materials. Bentonite pellets were added to a minimum depth of two feet above the filter pack and then hydrated to form a seal. The remaining annulus was filled with dry cuttings, that had no visible oil staining or detectable hydrocarbon as measured with the OVA, from the vadose portion of the borehole to within two feet of ground surface.

The piezometer well completions consist of a locking six-inch protective well casings set into a four by four foot by six-inch sloped concrete pad. The well pads have four three-inch concrete filled steel protective casings placed eighteen inches in the ground at each corner of the well pad. The well casings were filled with concrete to a height of greater than twelve inches above natural ground surface. A flush mount surface cover was used in place of the steel protective well casing at PD-15 and PD-20. The surface mount cover was utilized in order not to impede traffic in the roadway.

A piezometer well construction summary is submitted in **Appendix C - Soil Assessment**. The soil boring logs, interval screened, gravel pack interval, survey data, and analytical data is summarized on the piezometer well installation forms.

4.1.5 Decontamination Procedures

In order to eliminate the possibility of cross-contamination, special procedures were followed during the field inve·tigation. The most effective procedure utilized was contamination avoidance. As much as possible, dedicated and/or disposable equipment were used to collect samples. Personnel coming in contact with samples used a level of personnel protection as indicated by the Site Specific Health and Safety Plan. Gloves were replaced each time a new sample was handled.

The sampling tools utilized in the investigation were decontaminated between collection of individual samples. All downhole equipment and the drilling rig was decontaminated prior to initiating the drilling of a soil boring. The sampling tools, drill rig, and downhole equipment was decontaminated using a high-pressure, hot water steam cleaner and a high-pressure potable water rinse. Those items for steam cleaning would include drill pipe, hollow-stem auger flights, drill bits, tremie pipe, and down hole sampling devices.

At the soil boring site, the sampling equipment was decontaminated between samples using first a washing and scrubbing in a mild laboratory detergent (Liquinox ©), followed by a potable water rinse, and then a final rinse using deionized water. The on-site decontamination procedures were used on sampling devices such as split spoons, Shelby tubes, as well as sample trays and stain-less steel trowels and knives. When in use or in storage, all uncontaminated equipment was protected from contamination by using plastic sheeting or some other appropriate method.

The down-hole equipment decontamination was performed near the API Separator. Care was taken to ensure that any overspray or runoff was collected, contained and labeled for later disposal. The collection method involved construction of a decontamination pad large enough to clean two hundred footage of hollow stem augers and the drill rig. The decon pad measured 20 by 40 ft. for a total area of 800 $ft.^2$ to decon. The decon pad construction consisted of placing ¾ inch ply-wood boards on the ground, surrounding the pad with wooden boards (2 x 12 inches by 20 ft.), then over laying everything with a 40 mil mylar linear. The decon pad was inspected daily to insure that no decon waters were escaping through possible tears in the linear. The containers are limited to the designated areas pending classification and disposal.

Personal health and safety procedures were used to limit exposure to contaminants.

4.2 Site Specific Lithology

The site specific lithology as determined by previous subsurface investigations conducted at the CORCO facility is the Quaternary Alluvial Deposits and the Tertiary Ponce Limestone. Previous investigations in these two formations were conducted by Versar, Inc. (1986), Roy F. Weston, Inc. (1989), and GDC Engineering, Inc. (1994).

The boring locations of the Phase I: Subsurface Oil Investigation are based on data derived from previous investigations at the CORCO Facility and the EPA approved Weston Work Plan. The position of the soil borings was made to complement data gathered from the previous investigations and gather enough data to form a facility wide subsurface data base.

The geology at the CORCO Facility has been determined to be the Quarternary Alluvial Deposits and the Tertiary Ponce Limestone. These formations were the lithographic units of interest during the Phase I: Subsurface Oil Investigation.

The road, Route 127, bisects the CORCO Facility on an east to west bearing. The roadway is built on/at the interface between the Ponce Limestone and Alluvial Deposits.

Route 127 is built on the Alluvial flats and follows the contour of the Ponce Limestone hill-sides. The road base has been raised above the surrounding land surface approximately one foot. The road is the main route for heavy equipment and traffic in and through the Petrochemical Complex. The presence of this roadway is significant as it appears to impact the geohydrology at the CORCO Facility.

4.2.1 Quarternary Alluvial Deposits

The Quarternary Alluvial Deposits are located in the low lying regions, at the CORCO Facility, south of Route 127. The Phase I investigation advanced eight (8) piezometer soil borings in the alluvial deposits to a maximum depth of thirty (30) feet below-land-surface. The elevation range, for the soil borings, was from 4.69 to 11.84 feet above mean sea level (ft. msl).

The soil borings, in the alluvial, indicate that there were two or more depositional environments in the area investigated. This can be seen in **Figure 6: Cross-Section A - A'**, which shows the lithology encountered in soil borings PD-1 through PD-8. The soil facies range from peat, to mixtures of sand, silt, clay and gravel. This composition of the facies indicates a wide energy range during the depositional environments. This energy was applied by wave action and currents affecting the composition during deposition of the facies. The exhibited rounding, sorting and winnowing in the alluvial facies exhibit the medium energy ranges and textural maturity, while the high energy ranges are exhibited as textural inversions. A supra-tidal environment has a wide energy range and textural maturity range.

The lithology can be interpreted as being constructed of three zones. The first zone is varying grades of silty clay to silty clayey gravel. This zone appears to be fill material. The fill material originates from the Ponce Limestone and most likely was deposited during construction of the CORCO Tank Farm. The second zone shows facies of diverse compositions of peat to organic silty clays. The third zone shows facies of clay, silt and sands with some gravels.

The soil borings PD-1 through PD-8 indicate a relatively moderate energy depositional environment with in the second depositional zone. These facies were encountered at five to twenty three (5 to 23) ft. bls. The facies, in these borings, are varying compositions of peat to organic silty clays. A peat zone was found in PD-2 at ten to twelve (10 to 12) ft. bls. To the east, in borings PD-5 and PD-7, clay lenses were found at ten to fourteen (10 to 14) ft. bls. Boring PD-8 showed a gravelly sand at ten to fifteen (10 to 15) ft. bls, with in the second depositional zone.

The third zone was encountered at sixteen to twenty-two (16 to 22) ft. bls. This zone has silty sand, clayey sand and gravelly sand facies. The sediments range from well sorted grains in a clay matrix to sub-rounded grains in a silty clay matrix. This is indicative of a high energy depositional environment, by the textural inversions of the facies.

The Alluvial Deposits show a range of energy during the depositional environment. The textural maturity of the facies falls with in the immature, sub-mature to mature ranges. The depositional environments in these energy ranges are flood plain, lagoon/swamp, river channel, and beach and bar environs. The facies also exhibit textural inversions that indicate multiple source material or reworked older sediments into primary deposits.

The depositional environment, encountered during the investigation of the Alluvial Deposits, is reflected by the textural maturity and textural inversions of the facies composition. The older facies, the third depositional zone, exhibit a beach-bar composition. The second depositional zone shows a range of maturity and textural inversions that is indicative of low to moderate energy environs. The winnowing and sorting of the second zone facies exhibits deposition features of Lagoon/swamp and river/splay deposits. These findings are consistent with the U.S. Geological Survey report on the water resources of the Tallaboa Valley (Grossman, et. al. 1972).

4.2.2 Tertiary Ponce Limestone

The Tertiary Ponce Limestone deposits are located in the upland regions, at the CORCO Facility, north of Route 127. The Phase I investigation advanced twenty-six (26) piezometer soil borings in the Ponce Limestone deposits to a maximum depth of one hundred and ninety (190) feet below-land-surface. The elevation range, for the soil borings, was from 29.56 to 164.25 feet above mean sea level (ft. msl).

The twenty-six (26) soil borings drilled in the Ponce Limestone are located north of Route 127. The lowest string of soil borings, PD-9 through PD-18, are located south of the process areas at two elevation ranges of approximately 30 to 40 ft. msl and 60 to 75 ft. msl. These borings are spaced equal-distance, on an west to east bearing, from southwest of Tank 1011 to due east of PROLAB. The second string of soil borings, PD-23, PD-24, PD-19, PD-20, PD-21, PD-27, PD-28, PD-29, and PD-22, are located on the roadway north of the process areas. The second string of borings is at two elevation ranges of approximately 60 to 75 ft. msl and 130 to 165 ft. msl. These borings are spaced equal-distance, on a west to east bearing, from due west of Tank 965 to due north of CPI 1. The third string of soil borings, PD-30, PD-31, PD-32, PD-25, and PD-26, at two elevation ranges of approximately 60 to 75 ft. msl and 130 to 160 ft. msl. These borings are spaced equal-distance, on a west to east bearing, from due west of Tank 955 to south east of Tank 973. The third string of soil borings is located south of the MIS Area.

The three strings of soil borings have been plotted as cross-sections. The lithology of the lowest string of soil borings is **Figure 7: Cross-Section B - B'**; the lithology of the second elevation string is **Figure 8: Cross-Section C - C'**; and the lithology of the third elevation string is **Figure 9: Cross-Section D - D'**.

Most of the Ponce Limestone is a yellowish-white chalky limestone. The Ponce Limestone is generally massive, but includes some thin dense strata and clay facies. The formation is commonly fossiliferous (USGS, 1972). The Ponce Limestone at the CORCO Facility trends 86 to 94 degrees east and dips 18 to 22 degrees south.

The Ponce Limestone can be chemically classified as: 1) allochems, 2) microcrystalline calcite, and 3) sparry calcite. The Ponce generally contains sparry calcite and in locations is highly fossiliferous. The Ponce commonly falls within the Sparry Allochemical Limestone (sparites) Compositional Classification. The Type I: sparites indicates the limestone was deposited in an environment of vigorous winnowing action and pretty efficient sorting (R.L. Folk, Petrology of Sedimentary Rocks, 1980). This can be seen in the Ponce Limestone as the formation often shows good bedding, close packing and good orientation of allowchems.
This indicates the depositional environment, of the Ponce Limestone at the Facility, was generally a high energy environment with strong currents with areas of low energy weak currents.

This energy environment is consistent with the depositional features evidence at the CORCO Facility in the Ponce Limestone. The reef complex structures would show both high and low energy depositional features such as wash-outs and winnowing effects, which the Ponce does in both textural and compositional variation. The compositional diversity, of the Ponce Limestone, ranges from sparry calcite to microcrystalline calcite. The reef complex typically has areas of very strong currents, areas of short lived currents and areas of weak currents.

The clastic limestone classification, for the Ponce Limestone, ranges from a calcisilite to a calcirudite according to the Clastic Limestone Classification System (American Association of Petroleum Geologists, R. L. Folk, 1959). The calcite grain size ranged from fine to very coarse (0.03 mm to 2.0 mm) in all Phase I soil borings drilled in the Ponce Limestone. The borings PD-27, PD-28, and PD-29, the upper east-most string, evidenced some very hard zones of calcircudite at fifty-two to sixty-eight (52 to 68) ft. bls

The Ponce Limestone contains many structural features that can be generalized across the CORCO Facility. The bedding of the Ponce dips at eighteen to twenty-two (18 to 22°) degrees at the Facility. The Ponce Limestone strikes at eighty-six to ninety-four (86 to 94°) degrees east. Numerous joints and fractures, in the Ponce Limestone, can be evidenced in out-crops across the Facility. There are reef structures that cross the bedding plains. A complex reef structure out-crops due north of the Machine Shop and between PD-31 and PD-32. These structural features control the rate and location of the digenesis of the limestone.

The dip, of the bedding plains, tend to influence the migration pathways at and to the water table. The numerous joints and faults effect vertical migration, with weathering occurring in the joints and faults. The Tank Farm evidences two locals of considerable joints that dip at approximately two hundred (200°) degrees south, or perpendicular to the bedding plains of the Ponce Limestone. These areas are located on the second string of the Phase I soil borings. The first zone of jointing was show in the Tank Farm west-central soil borings at PD-24, PD-19, PD-20 and PD-21. The second zone of jointing was show in Tank Farm east-central soil borings at PD-28 and PD-29. The joint surface trace can been viewed in both the outcrops and on the Tank Farm roadway.

The 18 to 22° dip of the Ponce Limestone effects the horizontal pathways at the water table. This feature was evidenced at PD-17, PD-18, and PD-25. Small cavities of a soft "calcite gel" four to seven feet in height were encountered at the water table. The cavities at PD-17 and PD-18 were each filled with approximately 25 sacks of filter pack gravel. The cavity at PD-25 required approximately ten cu. yds. of gravel to be filled.

These cavities should not be viewed as phreatic caves as: 1) they were filled with a "calcite gel"; 2) they were only evidenced at PD-17, PD-18 and PD-25; and 3) "heaving sands" are predominant through out the Ponce Limestone. The cavities found at PD-17 and PD-18 are similar with a four to four and a half foot height, "heaving sands" and both requiring twenty-five sacks of gravel to filter pack the piezometer screen. This may be a single area of very soft "calcite gel". The cavities are most likely a localized solution mechanism of recharge and discharge, but may possibly be a chemical mechanism as these piezometers are confirmed to contained free-phase product.

The dip of the Ponce Limestone along with weathering effects have resulted in a relatively horizontal water table that cuts across the bedding plains. The water table in the Ponce Limestone was generally encountered at two to five feet above mean sea level. The formation often showed "heaving sands" at or just below the point of saturation. This was evidenced in every soil boring, drilled in the Ponce Limestone, during the Phase I: Subsurface Oil Investigation. The widespread "heaving sands" is indicative of diffuse-flow pathways and the aquifer should act as a homogeneous, isotropic porous media (Applied Hydrology, Fetter, 1988).

The Ponce Limestone aquifer consistently was encountered near sea level, except at PD-13. The soil boring PD-13 lithology is typical of the Ponce Limestone, but the saturated zone is an anomaly compared to all other borings in the Ponce Limestone. The saturated zone was encountered at thirteen feet below land surface in PD-13. This saturated zone, at PD-13, is a "perched aquifer" above the normal water table surface. The potentiometric level measurements collected on September 27, 1994, also indicate PD-13 as an outlier. The recharge source for PD-13 has not been identified at this point in time.

4.3 Waste Management and Disposition

The drummed drill cuttings and decontamination wastes generated during the Phase I: Subsurface Oil Investigation are being stored on-site in an environmentally safe manner until proper disposal. CORCO will collect representative samples from the stock-piled waste soils and waters and analyze for selected volatile, semi-volatile and metals. The results of the analyses will be used to select an appropriate disposal option. The generated wastes are being stored on-site in labeled containers. The label is written in permanent metal marker and has the name of the generator and description of the contents of the waste generated.

5.0 GROUNDWATER ASSESSMENT

The groundwater assessment for the Phase I: Subsurface Oil Investigation is primarily concerned with finding the presence and volume of free-phase product on the water table at the CORCO Facility. The validation of free-phase product, in the soil borings that indicated product, followed the development of the piezometer development.

The level measurements were collected following a substantial rainfall after a long period of severe drought. The infiltration/precipitation at the site may have distorted the static levels during this level measurement program. The free-phase product and static water levels will be confirmed in the next level measurement.

The level measurements indicate a large hydraulic ridge trending northwest to southeast. The ridge extends from piezometer PD-31 to PD-7. The level measurements of the potentiometric surface range from 7.09 to 18.81 ft msl. The potentiometric measurement at PD-13 was the highest point on the hydraulic ridge. This piezometer is screened in a "perched aquifer" above the water table.

The collected survey and fluid level monitoring data was utilized for basic groundwater characterization, at the CORCO Facility. The ground water parameters discussed in this section are flow direction, gradient, velocity, and hydraulic conductivity.

5.1 Survey Methodology

At piezometer well completion, the location and elevation of the piezometer wells relative to a standard datum was established. The piezometer wells were accurately located and referenced to a vertical datum by a licensed surveyor in the Commonwealth of Puerto Rico.

The Phase I: Subsurface Oil Investigation piezometers were surveyed to meters above mean sea level. The survey data was converted to feet above mean sea level using the constant of 0.3048 feet per meter. The ground surface and piezometer pad elevations were converted to ft. msl using the same constant. The survey data was converted to ft. msl to keep the measurement and reporting units constant as drilling was recorded in ft. bls and static measurements were collected in 0.01 ft. increments.

The piezometer locations were surveyed from a standard reference Facility Grid Point and established USGS datum point. The licensed surveyor also surveyed the piezometer Top of Casing (TOC) elevations, the well pad elevations, and elevation of the undisturbed land surface adjacent to the newly installed piezometer wells. The difference between these two elevations is equal to the amount of casing stickup for each piezometer well.

The piezometer wells were surveyed vertically and horizontally at three (3) points. These survey points are as follows:

1. ground surface due north;
2. pad surface due north and adjacent to the well casing; and
3. Top-of-Casing (TOC) due north.

The NORTH Top-of Casing (TOC) reference point serves as the precise reference point on the Phase I: Subsurface Oil Investigation piezometer wells.

5.2 Fluid Level Monitoring

On September 9, 1994, CORCO started the piezometer well development for all thirty-two piezometers installed during the Phase I: Subsurface Oil Investigation. The development of the thirty-two piezometers was completed on September 24, 1994 (reference **Appendix C**). The developed piezometers were allowed to equilibrate seventy two (72) hours prior to level measurements. The level measurements were conducted on September 27, 1994. All thirty-two (32) piezometers, eight (8) Site Assessment monitor wells, and six (6) M.I.S. Area monitoring wells were measured using an Oil/Water Interface Probe. The Oil/Water Interface probe was utilized to validate the presence of Free-Phase hydrocarbons with in the piezometers listed above.

This section describes the methodology that was used during the piezometer development and the collection of groundwater and product level measurements from all wells at the CORCO Facility. Field measurements of pH, temperature and specific conductivity were recorded. All sampling and analytical methods were conducted in accordance with EPA

SW-846: Test Methods For Evaluating Solid Waste. Prior to use, the conductivity and pH meters were calibrated in accordance with manufactures recommendations and procedures established in SW-846.

The condition of the protective cover, well casing and surface pad were assessed and if the well conditions were not to the recommended RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD-U.S. EPA, 1986) standards, this was recorded in the field logs. The area around the well head and purge water container was covered with disposable plastic sheeting to avoid possible release of contaminated waters to the ground surface.

Prior to sampling, the fluid level measurement of total depth (TD) for each well was conducted and compared to the well completion data sheets in order to confirm well integrity and rate of sedimentation with in each well. All measurements were recorded to the nearest hundredth (0.01) of a foot and referenced to a marked location on the well casing. The static water level measurements were collected by interface probe or an electric line probe (E-line). The interface probe was utilized to determine if there was a LNAPL layer within the well system. These instruments were the only non-dedicated equipment to enter the wells.

Each well was then developed (evacuated) to remove stagnant non-representative waters and sediments from the screened well facie. The procedures for well development were as follows:

1. After determining the depth to groundwater from top of casing (TOC), the volume of water to be evacuated from the well will be calculated by using the following steps:

   - Determine the height of the column of fluid in the well by taking the difference between the value of TOC and TD.

   - Determine the area of the well-bore using the following formula:

     Area $= \pi r^2$

     where:

     $\pi = 3.14$

     r is the radius of the well bore (in feet)

   - Determine the borehole volume in gallons using the following formula:

     Volume = (7.48)(HA)

     where:

     7.48 is the factor for converting cubic feet to gallons

     H is the height of the column of water (in feet)

A is the area of the well bore (in square feet)

- Multiply by 3 or 5 to determine minimum well bore volumes in gallons.
  (a minimum 5 well bore volumes to develop the well)
  (a minimum 3 well bore volumes to purge the well)

A quick method of conversion is:	
One Casing Volume (gallons) = **H** x (gal/ft of water)	
Conversions from well diameter to gal/ft of water are:	
2" well = 0.17 gal/ft	4" well = 0.66 gal/ft
6" well = 1.5 gal/ft	8" well = 2.6 gal/ft

2. Once the volume of water to be evacuated is calculated the area around the well is prepared for purging of the wells. The ground surface, between the well head and development water barrel, is covered with 4 ml mylar and bermed (approximately 4 ft by 4 ft). Each well may be supplied with dedicated bailers and bailer rope.

3. Temperature, pH and specific conductivity will be measured in the field during the development process. A measure of each parameter will be recorded for each well volume of fluid removed. If a well is purged to dryness then it will be deemed not necessary to evacuate the total number of well volumes.

The time, volume, pH and specific conductance of the purged volumes of water was recorded in the field logs. After sufficient time to allow the well recovery, the static fluid levels (hydraulic head) was again measured with an interface probe or E-line. When the well had been allowed to recovered to the approximate static water level, three days, the well was measured for free-phase product.

The measuring equipment was decontaminated between each well use to prevent possible cross-contamination. Decontamination consisted of a phosphate-free detergent wash followed by a potable water rinse then a rinse with de-ionized water.

5.3 Groundwater Characterization

Earlier site assessment work discovered the existence of free-phase product on the water table within the fractured matrix of the Ponce Limestone. A previous investigation within the northwest portion of the facility, conducted by Roy F. Weston, Inc. (1989), encountered free-phase product during an Environmental Impact Statement investigation. The study was conducted at the proposed Modular Incineration Systems, Inc. site (MIS) Area, which is located due north of Tank 965 and Tank 956.

A number of wells have been installed at the CORCO Facility during various subsurface investigations. To date, forty-six (46) piezometers and monitoring wells have been installed at the CORCO facility. In September, 1994, CORCO conducted the piezometer well development for the thirty-two installed piezometers. The thirty-two (32) piezometers, eight (8) Site Assessment monitor wells, and six (6) M.I.S. Area monitoring wells were measured using an Oil/Water Interface Probe. The Oil/Water Interface probe was utilized to validate the presence of Free-Phase hydrocarbons with in all piezometers and monitoring wells installed at the CORCO Facility.

The MIS Area field level measurements were collected between the period of 10:40 AM and 11:27 AM. The Phase I: Subsurface Oil Investigation piezometers field level measurements were collected between the period of 8:15 AM and 11:38 AM. The Eastern Lagoon field monitoring wells level measurements were collected between the period of 12:15 AM and 12:25 AM. The Western Lagoon monitoring wells field level measurements were collected between the period of 11:49 AM and 12:15 AM on September 27, 1994.

The level measurements were collected following a rainfall of approximately three (3) inches after a substantial period of drought. The infiltration/precipitation at the site may have distorted the static levels during this level measurement program. The free-phase product and static water levels will be confirmed in the next level measurement.

5.3.1 Groundwater Flow Direction

The level measurements for the thirty-two piezometers, six MIS Area monitoring wells and eight RCRA monitoring wells were collected on the morning of September 27, 1994. The measurements were collected within a five (5) hour period so that tidal influences would not impact the data. The collected level measurements are tabulated in **Table 4** and the data collection sheets are contained in **Appendix C.**

The level measurements were reduced to ft. msl to construct a potentiometric surface map of the CORCO Facility. The monitoring wells and piezometers that had free-phase product were corrected using a specific gravity of 0.90 for the product. The corrected measurements were then plotted as **Figure 10, Potentiometric Measurement Map (09/27/94)**. The groundwater flow is assumed to be steady-state, flow is assumed to be laminar and Darcy's Law is assumed to be valid. These assumptions were made to generate the September 27, 1994 potentiometric surface at the Facility.

The potentiometric surface ranges from a level of -0.87 to 18.81 ft. msl. The standard level was between two and five ft. above msl. The level measurement at PD-13 was recorded at 18.81 ft. msl. This potentiometric level is an outlier. This piezometer well is screened from eight to twenty-eight (8 to 28) ft. bls in a perched aquifer. The static measurement at PD-13 was utilized in construction of the potentiometric surface as it is believed to be relevant to the characteristics of the water table. The level measurements at PD-13 also agrees with a hydraulic ridge trending northwest to southeast across the facility.

The complex potentiometric surface, at the CORCO Facility, indicates several groundwater flow directions. The groundwater flows southeast towards Guayanilla Bay, northeast towards Tank Farm Central Area, and northwest towards the Tank Farm Central Area. The potentiometric measurements were plotted using a groundwater modeling program. These plots are **Figure 12: X-Y Potentiometric Measurement Map** and **Figure 13: XY-Z Potentiometric Measurement Map**. The model was used to verify the complex groundwater flow patterns across the facility.

A large hydraulic ridge is present trending northwest to southeast. The hydraulic ridge extends from PD-31 to PD-7. The level measurements of the ridge range from 7.09 to 18.81 ft msl. The potentiometric level measurement, on the northwest to southeast hydraulic ridge, were PD-31 at 7.09 ft. msl, PD-19 at 10.60 ft. msl, PD-13 at 18.81 ft. msl, and PD-7 at 7.18 ft. msl. The data from piezometer well PD-13 was utilized even though the piezometer is screened in a perched aquifer. None of the wells in the hydraulic ridge had any recordable free-phase product.

The groundwater in the hydraulic ridge flows from the west to the northeast towards the Tank Farm Central Area in the Ponce Limestone. The groundwater flowing from the east to northwest direction, in the Ponce Limestone, may be due to mounding at the interface between the Ponce Limestone and the Alluvial formation. The road base of Route 127 may also be acting as an aquitard in the upper reaches of the water table at the CORCO Facility.

5.3.2 Groundwater Gradient

The hydraulic gradient, at the CORCO Facility, has been calculated for three groundwater flow directions. These flow directions are as follows:

Southeast towards Guayanilla Bay;
Northeast towards Tank Farm Central Area; and
Northwest towards the Tank Farm Central Area.

The hydraulic gradient is defined as the change in static head per unit distance in a given direction. The hydraulic gradient defines the direction of flow. The hydraulic gradient is calculated from wells with intermediate water levels (Heath, U.S.G.S. Paper 2220, 1989).

The groundwater gradient is calculated from the static level measurements of piezometers PD-10, PD-11 and PD-2 for the groundwater flow direction of southeast towards Guayanilla Bay. The up-gradient wells, for the southeast groundwater flow direction, are PD-10 and PD-11 and the down-gradient well is PD-2. The level measurements are 2.13, 3.90, and 1.08 ft. msl, respectively. The distance between PD-10 and PD-2 is 678.73 ft., and the distance between PD-11 and PD-2 is 1,059.86 ft. The change in head between PD-2 and PD-10 is 1.05 ft., and between PD-11 and PD-2 is 2.82 ft. The calculated hydraulic gradient from PD-10 to PD-2 is 1.55 x 10^{-3} ft/ft, and from PD-11 to PD-2 is 2.66 x 10^{-3} ft/ft. The average calculated hydraulic gradient, for the southeast groundwater flow direction, is 2.08 x 10^{-3} ft/ft.

The groundwater gradient is calculated from the static level measurements of piezometers PD-31, PD-19 and PD-25 for the groundwater flow direction of northeast towards the Tank Farm Central Area. The up-gradient wells, for the southeast groundwater flow direction, are PD-31 and PD-19 and the down-gradient well is PD-25. The up-gradient piezometers PD-31 and PD-19 are located in the hydraulic ridge. The level measurements for PD-31, PD-19 and PD-25 are 7.09, 10.60, and 3.38 ft. msl, respectively. The distance between PD-31 and PD-25 is 1,415.80 ft, and the distance between PD-19 and PD-25 is 724.40 ft. The change in head between PD-31 and PD-25 is 3.71 ft., and between PD-19 and PD-25 is 7.22 ft. The calculated hydraulic gradient from PD-31 to PD-25 is 2.62 x 10^{-3} ft/ft, and from PD-19 to PD-25 is 1.00 x 10^{-2} ft/ft. The average calculated hydraulic gradient, for the northeast groundwater flow direction, is 1.00 x 10^{-2} ft/ft.

The groundwater gradient is calculated from the static level measurements of piezometers PD-16, PD-28 and PD-27 for the groundwater flow direction of northwest towards the Tank Farm Central Area. The up-gradient wells, for the southeast groundwater flow direction, are PD-16 and PD-28 and the down-gradient well is PD-27. The level measurements are 4.70, 4.81, and 3.54 ft. msl, respectively. The distance between PD-16 and PD-27 is 656.58 ft., and the distance between PD-28 and PD-27 is 446.82 ft. The change in head between PD-16 and PD-27 is 1.16 ft., and between PD-28 and PD-27 is 1.27 ft. The calculated hydraulic gradient from PD-16 to PD-27 is 1.77 x 10^{-3} ft/ft, and from PD-28 to PD-27 is 2.84 x 10^{-3} ft/ft.

The average calculated hydraulic gradient, for the northwest groundwater flow direction, is 2.30 x 10^{-3} ft/ft. The average hydraulic gradient uses the calculated northwest groundwater flow direction, which is steepened due to the hydraulic ridge.

5.3.3 Hydraulic Conductivity

The hydraulic conductivity is a measure of a materials ability to transmit water. The conductivity for the Ponce Limestone aquifer is an estimate based on hydrometer/sieve analysis using geotechnical methodology ASTM 63 D422 (rev. 1990). The particle distribution was evaluated on the first and third string of Phase I soil borings. Three lines trending north-south were chosen at the east, central and west sections of the facility. A sample was randomly selected, from the list of samples to be analyzed, from the saturated zone of six soil borings. There was hydrometer/sieve data on five of the six selected soil samples from the aquifer of the Ponce Limestone.

The hydraulic conductivity (K) is estimated from the particle size distribution using the Hazen formula:

$$K = A(d_{10})^2$$

where:

d_{10} is equal to the effective grain size, which is that grain size diameter at which 10 percent by weight of the particles are finer and 90 percent are coarser (Freeze and Cherry, 1979)

A is equal to 1.0 when K is in units of cm/sec and d_{10} is in mm.

The following is a list of the sample point, depth below ground surface and analytical d_{10} results used to estimate the hydraulic conductivity at the CORCO Facility:

Sample Point	Depth (ft. bls)	d_{10} (mm)
PD-10	45-47	0.1
PD-14	40-42	0.01
PD-17	44-46	N/A
PD-31	105-107	0.1
PD-26	170-172	0.1
PD-29	120-122	0.01

The conversion constant of 2,835 ft/day was used to convert hydraulic conductivity units reported in cm/sec to ft/day. The estimated hydraulic conductivity across the CORCO Facility ranges from 28.35 ft./day to 283.5 ft./day. This estimate is acceptable as the resulting conductivity values only vary a magnitude between all results calculated.

The estimated conductivity will be verified by analyzing the pumping rate from recovery wells at the MIS Area. The field data collection is scheduled to start in early November 1994. This data collection will give actual hydraulic values for the Ponce Limestone in the northwest Tank Farm Area. The field data will be pumpage rate, draw-down and possibly the cone of influence. Data reduction will yield Hydraulic conductivity, storativity and transmissivity of the Ponce Limestone in the MIS Area.

5.3.4 Groundwater Velocity

The groundwater velocity is directly related to hydraulic gradient. The average linear velocity (v) of the groundwater at the CORCO Facility was calculated using Darcy's Law. Darcy's Law is as follows:

$$v = -\frac{Ki}{n_e}$$

where:

K is the hydraulic conductivity (length/time)
i is the hydraulic gradient (length/length)
n_e is the effective porosity

The values derived from the hydraulic estimates calculated for the Ponce Limestone aquifer are the values utilized to estimate the groundwater velocity. These values are:

K = 28.35 ft./day to 283.5 ft./day
i = 2.30×10^{-3} ft/ft.
n_e = 1.0

The effective porosity for water is 1.0 using the assumption that all pores in a sediment are inter connected (Fetter, 1989). The estimated groundwater velocity ranges from 0.07 to 0.65 ft./day in the Ponce Limestone aquifer at the CORCO Facility.

5.4 Extent of Free-Product on Groundwater

The vertical positions of the well screens were based on the physical/chemical characteristics of a hydrocarbon product. The lengths of the well screens were based on the approved Phase I: Subsurface Oil Investigation Work Plan (Weston, 1990). The hydrocarbons act as Light Non-Aqueous Phase Liquids (LNAPL's) that migrate in the capillary zone just above the water table. The piezometer wells are screened five (5) feet in the capillary fringe and fifteen (15) feet into the water table. This configuration should allow detection of the free-product during periods of minimum and maximum elevations of the water table.

The start date for the Well Development Program for the Phase I: Subsurface Oil Investigation was on September 9, 1994 with completion on September 24, 1994. The developed piezometers were allowed to equilibrate seventy two (72) hours prior to level measurements. The thirty-two (32) piezometers, eight (8) Site Assessment monitor wells, and six (6) M.I.S. Area monitoring wells were then measured using an Oil/Water Interface Probe. The level measurements were conducted on September 27, 1994 between the hours of 8:15 AM and 12:27 PM. Two crews were utilized to collect the level measurements between periods of possible tidal influence.

Thirty-two (32) piezometers were installed at the CORCO Facility during the Phase I: Subsurface Oil Investigation. The piezometers that had indications, during installation, of free-product are listed below:

> PD-4, PD-9, PD-10, PD-11, PD-12, PD-14, PD-15, PD-16, PD-17, PD-18, PD-20, PD-23, PD-25, PD-26, PD-27, PD-28, PD-29, PD-30, PD-31 and PD-32.

The Oil/Water Interface probe was utilized to validate the presence of free-product within the piezometers listed above. Concurrent with the piezometer level analysis, the Oil/Water Interface Probe was utilized to validate the presence of Free-Phase and/or liquid level at the six (6) monitoring wells at the M.I.S. Area and the eight (8) Site Assessment monitor wells.

During the field level measurements the following piezometers that had prior indications of free-phase product during installation did not have any free-phase product as measured, on September 27, 1994, with an oil/water interface probe: PD-12, PD-29, PD-30, and PD-31 (refer to **Table 4, Level Measurements**).

The estimation of free-product at the CORCO Facility has been derived from field measurements collected by field personnel. The field measurements were collected using oil/interface probes. The field measurements were collected on the morning of September 27, 1994. The measurements were collected within a five (5) hour period so that tidal influences would not impact the data.

The free-phase product level measurements data was reduced and plotted as a product isopach. The data reduction is the measurement from TOC to the product level minus the measurement from TOC to static water level. The measured product levels were then plotted as an isopach. The isopach indicates that there are five (5) areas of free-phase product at the CORCO Facility. These areas of Free-phase product are designated as: the MIS Area, the Tank Farm West Area, the Facility South Area, the Tank Farm Central Area, and the Process Area (refer to **Figure 5, Product Isopach 09/27/94**).

5.4.1 Extent of Groundwater Impact

The extent of the groundwater impact from free-phase product is estimated from the amount of product measured in the monitoring wells and piezometer wells at the CORCO Facility on September 27, 1994. The level measurements were collected following a rainfall of approximately three (3) inches after a substantial period of drought. The infiltration/precipitation at the site may have distorted the in-situ product levels during this level measurement program. The free-phase product and static water levels will be confirmed in the next level measurement.

The field level measurements were collected on the morning of September 27, 1994. The measurements were collected within a five (5) hour period so that tidal influences would not impact the data.

The MIS Area field level measurements were collected between the period of 10:40 AM and 11:27 AM. The Phase I: Subsurface Oil Investigation piezometers field level measurements were collected between the period of 8:15 AM and 11:38 AM. The Eastern Lagoon field monitoring wells level measurements were collected between the period of 12:15 AM and 12:25 AM. The Western Lagoon monitoring wells field level measurements were collected between the period of 11:49 AM and 12:15 AM on September 27, 1994.

The MIS Area monitoring wells showed free-phase product levels ranging from non-detect to 10.20 feet. The largest layer of free-phase was detected in monitoring well MW-05, with 10.20 feet. MW-01 and MW-02 did not show any free-phase product. Monitoring wells MW-03, MW-04, and MW-06 exhibited free-phase levels of 8.63 ft., 6.96 ft., and 7.98 ft., respectively.

The Tank Farm West Area had free-phase product levels that ranged from non-detect to 10.23 ft. Piezometer PD-11 had the greatest amount of product at a thickness of 10.32 ft. Piezometer wells PD-30, PD-31, PD-24, PD-12, PD-3, PD-2 and PD-1 did not contain any free-phase product as measured by the oil/water interface probe. Monitoring well WL-1 contained 0.62 ft. of free-phase. The piezometer wells PD-9 and PD-23 had 9.71 ft. and 9.35 ft., respectively. Piezometer PD-10 had 10.23 ft. of product.

The Facility South Area had only one piezometer that showed free-phase product. This piezometer was PD-4 with 12.06 ft. of product.

The Tank Farm Central Area piezometer wells showed free-phase product levels ranging from non-detect to 10.15 feet. The largest layer of free-phase was detected in piezometer PD-26, with 10.15 feet. Piezometer wells PD-19, PD-24, PD-12, PD-13, PD-3, and PD-21 did not contain any free-phase product as measured by the oil/water interface probe. Piezometer wells PD-20, PD-25, and PD-32 showed free-phase product levels of 8.34 ft., 9.20 ft., and 9.92 ft., respectively.

The Process Area piezometers had free-phase product levels that ranged from non-detect to a high of 9.13 ft. of product. The high was measured in PD-27. Piezometer wells PD-19 and PD-22 did not show any free-phase as measured by the oil/water interface probe. The piezometers PD-14, PD-17, and PD-18 had free-phase levels of 0.65 ft., 3.47 ft., and 3.59 ft., respectively. The piezometers PD-15, PD-16, and PD-28 showed product levels of 9.08 ft., 7.60 ft., and 7.96 ft., respectively.

5.4.2 Product Characterization

The product at the CORCO Facility has been characterized by analyzing material collected during the Phase I: Subsurface Oil Investigation. The collected product was submitted to and analyzed by the Puerto Rico Oil Laboratory (PROLAB) at the CORCO Facility. The analyses preformed, by PROLAB, on the product was: IBP Distillation, Reid Vapor Pressure (R.V.P.), A.P.I. Gravity, Sulphur Weight %, Aromatics Volume %, Benzene Weight %, and Heating Value Gross in BTU/Lb. The analyses, conducted by PROLAB, indicates the product is mixture of Solvents - Gasoline - Heavy Gas Oil - Lubricating Oil.

The product was collected during the Phase I: Subsurface Oil Investigation soil boring and piezometer installation. When a free-phase product was encountered during the drilling of the soil borings, it was always at the water table. Various volumes of product would be pulled up-hole while removing the drill stem from the augers. The product ranged from "gasoline" to a "muddy slush" type material. The product was collected in a five gallon bucket, strained and immediately placed in a one liter glass sample bottle. The free-phase product sample was then delivered to PROLAB. The time period from product collection to deliver to the laboratory was less than twenty minutes (≤ 20 min.).

The analyses preformed, by PROLAB, on the product was: IBP Distillation, Reid Vapor Pressure (R.V.P.), A.P.I. Gravity, Sulphur Weight %, Aromatics Volume %, Benzene Weight %, and Heating Value Gross in BTU/Lb. The PROLAB results are as follows: the IBP Distillation Curve ranges from 100 to 310; the R.V.P. Reid Vapor Pressure ranges from a low of 0.0 to 9.7 (Lb./sq. in.); the A.P.I. Gravity had, at 60° F, ranges from 32.7 to 71.6 °API; the Sulphur weight, measured as a percent volume, ranged from 0.001 to 0.33 %; the Aromatics volume, measured as a percent volume, ranged from 15.6 to 82.1 %; the Benzene weight, measured as a percent volume, ranged from 2.10 to 34.70 %; and the Heating Value Gross was analyzed for two samples, the results were approximately 19,8000 BTU/Lb. The PROLAB results are tabled in **Table 6, Product Characterization.**

The PROLAB analyses indicate the free-phase product is a mixture of crude petroleum fractions. The product mixture ranges from the light gas fractions to heavier lubricating oils, depending on the sample location. The IBP Distillations show that the majority of the product sampled is a blend of diesel and gasoline. The sample collected from boring PD-4 contained the heavier crude fractions, and therefore indicates a different source area.

5.4.3 Product Mass-Balance

The Product Mass-Balance for the CORCO Facility is an approximation. The product mass-balance is derived from one (1) level measurement event. This event followed a period of substantial rainfall at the site. The mass-balance will be "fine tuned" following the next level measurement collected at the facility.

The MIS Area has a square footage of 263,034 ft.^{2}. The Tank Farm West Area has a square footage of 422,727 ft.^{2}. The Facility South Area has a square footage of 119,086 ft.^{2}. The Tank Farm Central Area has a square footage of 595,227 ft.^{2}. The Process Area has a square footage of 1,189,887 ft.^{2}. This is a total square footage of 2,562,961 ft^2 that has free-phase product at the CORCO Facility.

The total area was determined between the contour intervals for each free-product plume at the facility. These intra-plume areas were multiplied by the average thickness of the product within each contour interval. This resulted in a volume, measured in cubic feet, for each contour interval for each of the five areas of free-phase product at the CORCO Facility.

The Product Mass-Balance for the CORCO Facility is an approximation based on 30% porosity and 100% permeability. The product volume as calculated in cubic feet, within the five areas of free-phase product, was further reduced to give a volume in barrels of free-phase product. This calculation was performed using the constants of: 7.4805 gallons per cubic foot (7.4805 gal./ft^3) and forty two gallons per barrel (42 gal./barrel). This series of calculations resulted in approximate volumes of free-phase product in the five areas of free-phase product at the facility. The inter-contour volume results were produced in this calculation.

The volume of free-phase product, in the five areas, at the CORCO Facility is as follows:

> The MIS Area contained 83,551 barrels of free-phase product;
> The Tank Farm West Area contained 311,694 barrels of free-phase product;
> The Facility South Area contained 26,481 barrels of free-phase product;
> The Tank Farm Central Area contained 379,865 barrels of free-phase product; and
> The Process Area contained 577,759 barrels of free-phase product.

The calculations and the results of the product mass-balance are shown in **Table 5, In-Situ Oil Mass-Balance**. The table shows the inter-contour area and the inter-contour volumes in gallons and barrels. The total volume of free-phase product, at the CORCO Facility, is 1,379,351 barrels of product.

5.5 Waste Management and Disposition

The drummed drill cuttings and decontamination wastes generated during the Phase I: Subsurface Oil Investigation are being stored on-site in an environmentally safe manor until proper disposal. CORCO will collect representative samples from the stock-piled waste soils and waters and analyze for selected volatile, semi-volatile and metals. The results of the analyses will be used to select an appropriate disposal option. The generated wastes are being stored on-site in labeled containers. The label is written in permanent metal marker and has the name of the generator and description of the contents of the waste generated.

III. CONCLUSIONS AND RECOMMENDATIONS

III. CONCLUSIONS AND RECOMMENDATIONS

1.0 CONCLUSIONS

The Phase I: Subsurface Oil Investigation stems from the 1990 Settlement Agreement between the U.S. EPA and Commonwealth Oil Refining Company. The purpose for the location and placement of soil boring/piezometer wells was to develop a Facility wide information data base to determine the presence of free-phase product.

The boring locations of the Phase I: Subsurface Oil Investigation are based on data derived from previous investigations at the CORCO Facility and the EPA approved Weston Work Plan. The previous investigations at the CORCO Facility were conducted by Versar, Inc. (1986), Roy F. Weston, Inc. (1989), and GDC Engineering, Inc. (1994). The soil boring locations were made to complement data gathered from the previous investigations and gather enough data to form a facility wide subsurface data base.

The Phase I: Subsurface Oil Investigation was initiated in May 1994 to determine the presence and volume of free-phase product at the CORCO Facility. The Phase I: investigation involved drilling thirty-two (32) soil borings fifteen feet into the uppermost aquifer at the site, the installation of thirty-two (32) piezometers and fluid level measurements at the CORCO Facility. Soil samples were collected and submitted to Analytical Laboratory for geotechnical characterization. Light-Non-Aqueous Phase Liquids (LNAPL) oil samples were collected and submitted to a Petroleum Laboratory for product characterization.

The site specific lithology as determined by previous subsurface investigations conducted at the CORCO facility consists of Quaternary Alluvial Deposits and the Tertiary Ponce Limestone formations. These formations were the lithographic units of interest during the Phase I: Subsurface Oil Investigation.

The formations are described in Phase I: Subsurface Oil Investigation Report Section 4.2 - Site Specific Lithology, Section 4.2.1 Quaternary Alluvial Deposits, and Section 4.2.2 - Tertiary Ponce Limestone.

The aquifer system in both the Quaternary Alluvial Deposits and the Tertiary Ponce Limestone is evidenced to be acting under water table conditions. The aquifer system was consistently encountered at or near mean sea level. The potentiometric surface generally shows a flat gradient flowing southward towards the Guayanilla and Tallaboa Bays.

It was evidenced during the investigation that there are natural structural features of the Ponce Limestone that influence the potentiometric surface at the CORCO Facility. These structures are: 1) a perched aquifer at PD-13; 2) a northwest to southeast trending hydraulic ridge; 3) a mounding effect at the interface of the Ponce Limestone and the Alluvial Deposits; and 4) three small cavities.

The dip of the Ponce Limestone and weathering effects have resulted in a relatively horizontal water table that cuts across the bedding plains. The water table in the Ponce Limestone was generally encountered at two to five feet above mean sea level. The formation often showed "heaving sands" at or just below the point of saturation. This was evidenced in every soil boring drilled in the Ponce Limestone during the Phase I: Subsurface Oil Investigation. The widespread "heaving sands" is indicative of diffuse-flow pathways and the aquifer should act as a homogeneous, isotropic porous media (Applied Hydrology, Fetter, 1988).

The Ponce Limestone aquifer consistently was encountered near sea level, except at PD-13. The soil boring PD-13 lithology is typical of the Ponce Limestone, but the saturated zone is an anomaly compared to all other borings in the Ponce Limestone. The saturated zone was encountered at thirteen feet below land surface in PD-13. This saturated zone, at PD-13, is a "perched aquifer" above the normal water table surface. The potentiometric level measurements collected on September 27, 1994, also indicate PD-13 as an outlier. The recharge source for PD-13 has not been identified at this point in time.

A large hydraulic ridge trending northwest to southeast is present at the CORCO Facility. The hydraulic ridge extends from PD-31 to PD-7. The level measurements of the ridge range from 7.09 to 18.81 ft msl. The data from piezometer well PD-13 was utilized even though the piezometer is screened in a perched aquifer. None of the wells in the hydraulic ridge had any recordable free-phase product.

The groundwater in the hydraulic ridge flows from the west to the northeast towards the Tank Farm Central Area in the Ponce Limestone. The groundwater flowing from the east to northwest direction, in the Ponce Limestone, may be due to mounding at the interface between the Ponce Limestone and the Alluvial formation. The road base of Route 127 may also be acting as an aquitard in the upper reaches of the water table at the CORCO Facility.

The road, Route 127, bisects the CORCO Facility on an east to west bearing. The roadway is built on/at the interface between the Ponce Limestone and Alluvial Deposits. Route 127 is built on the Alluvial flats and follows the contour of the Ponce Limestone hill-sides. The road base has been raised above the surrounding land surface approximately one foot. The road is the main route for heavy equipment and traffic in and through the Petrochemical Complex. The presence of this roadway is significant as it appears to impact the geohydrology at the CORCO Facility by causing the potentiometric surface to form a mound at the interface between the Ponce Limestone and the Alluvial Deposits.

The dip, of the Ponce bedding plains, also influences the migration pathways at and to the water table. The 18 to 22o dip of the Ponce Limestone effects the horizontal pathways at the water table. This feature was evidenced at PD-17, PD-18, and PD-25. Small cavities of a soft "calcite gel" four to seven feet in height were encountered at the water table. These cavities are not regarded as phreatic caves because: 1) they were filled with a "calcite gel"; 2) they were only evidenced at PD-17, PD-18 and PD-25; and 3) "heaving sands" are predominant through out the Ponce Limestone.

The cavities found at PD-17 and PD-18 are similar in that they exhibit a four to four and a half foot height, "heaving sands" and required twenty-five sacks of gravel to filter pack the piezometer screen. This may be a single area of very soft "calcite gel". The cavities are most likely a localized solution mechanism of recharge and discharge, but may possibly be a chemical mechanism as these piezometers are confirmed to contained free-phase product.

The presence of free-phase product was indicated at a number of wells during of drilling of the soil borings. The piezometer wells were completed, developed and measured to confirm the presence of free-phase product.

1.1 Free-Phase Product Volume

The extent of the groundwater impact from free-phase product was estimated from the amount of product measured in the monitoring wells and piezometer wells at the CORCO Facility on September 27, 1994. The level measurements were collected following a heavy rainfall of approximately three (3) inches after a substantial period of drought. The precipitation at the site may have distorted the in-situ product levels during this level measurement program. The free-phase product and static water levels will be confirmed during the next level measurement program.

The field level measurements were collected on the morning of September 27, 1994. The static level measurements were collected within a five (5) hour period so that tidal influences would not impact the data.

The MIS Area field level measurements were collected between the period of 10:40 AM and 11:27 AM. The Phase I: Subsurface Oil Investigation piezometers field level measurements were collected between the period of 8:15 AM and 11:38 AM. The Eastern Lagoon field monitoring wells level measurements were collected between the period of 12:15 AM and 12:25 AM. The Western Lagoon monitoring wells field level measurements were collected between the period of 11:49 AM and 12:15 AM on September 27, 1994.

The level measurements indicate there are five areas at the CORCO Facility that contain detectable levels of free-phase product. These areas are: the MIS Area, the Tank Farm West Area, the Facility South Area, Tank Farm Central Area, and the Process Area.

The product mass-balance is derived from one (1) level measurement event. This event followed a period of substantial rainfall at the site. The mass-balance will be "fine tuned" following the next level measurement collected at the facility.

The Product Mass-Balance for the CORCO Facility is an approximation based on 30% porosity and 100% permeability. The product volume was calculated for the five areas of free-phase product based on the square footage in each area and the product thickness. This is a total square footage of 2,562,961 ft^2 that has free-phase product at the CORCO Facility. The calculation to give a volume in barrels of free-phase product was performed using the constants of: 7.4805 gallons per cubic foot (7.4805 gal./ft^3) and forty two gallons per barrel (42 gal./barrel). This series of calculations resulted in approximate volumes of free-phase product in the five areas of free-phase product at the facility.

The estimated volume of free-phase product, in the five areas, at the CORCO Facility is as follows:

The MIS Area contained 83,551 barrels of free-phase product;
The Tank Farm West Area contained 311,694 barrels of free-phase product;
The Facility South Area contained 26,481 barrels of free-phase product;
The Tank Farm Central Area contained 379,865 barrels of free-phase product; and
The Process Area contained 577,759 barrels of free-phase product.

The total estimated volume of free-phase product, at the CORCO Facility, is 1,379,351 barrels of product.

The product at the CORCO Facility has been characterized by analyzing material collected during the Phase I: Subsurface Oil Investigation soil boring program. The analyses, conducted by PROLAB, indicates the product is a mixture of Solvents, Gasoline, Heavy Gas Oil, and Lubricating Oils.

The PROLAB analyses indicate the free-phase product is a mixture of crude petroleum fractions. The product mixture ranges from the light gas fractions to heavier lubricating oils, depending on the sample location. The IBP Distillations show that the majority of the product sampled is a blend of diesel and gasoline. The sample collected from boring PD-4 contained the heavier crude fractions, and therefore indicates a different source area.

2.0 RECOMMENDATIONS

CORCO recommends the generation and initiation of a Phase II: Subsurface Oil Recovery Workplan for the Commonwealth Oil Refining Company Facility at Penuelas, Puerto Rico. The proposed workplan will detail the Oil Recovery Systems location, Recovery System design, and Recovery Well design. The Subsurface Oil Recovery Workplan will include engineered specifications for product pump rate, percent product volume reduction calculations, and time required for product volume reduction.

The intent of the Phase II: Subsurface Oil Recovery Workplan is to optimize the recovery of the free-phase product at the CORCO Facility. CORCO believes that properly engineered product recovery systems will remove a greater percent of product in a shorter time period. This will reduce the potential impact to human health and further impact to the environment.

CORCO recommends that hydraulic parameters of the Ponce Limestone water table be modeled following an additional static level measurement of the thirty-two (32) Phase I piezometers, six (6) MIS monitor wells, and eight (8) RCRA monitoring wells. The groundwater modeling will focus on flow pathways and theoretical particle tracking methods.

CORCO recommends the recovery of all free-phase product at the facility in the least amount of time required for efficient recovery of the product. CORCO is presently installing a free-phase product recovery pump system at the MIS Area for product recovery. This system is expected to go on-line in early November 1994. CORCO believes the collected data from the MIS Area recovery operations should be evaluated to optimize recovery of product from all other areas containing product at the facility.

The collected MIS Area recovery data will be useful in the design and installation of additional recovery systems for the Ponce Limestone aquifer. CORCO feels that the usage of a numeric computer modeling will augment the present knowledge of the aquifer system at the facility. The modeling procedures will also allow engineering recovery of product in the shortest time frame.

CORCO proposes to use the pump and treat process as it is one of the most common free product recovery technologies used at sites to both contain and recover a free-phase product. The free product pumping technique will involve the manipulation and management of groundwater to remove the free-phase product plume and to adjust groundwater levels to prevent the migration of the free-phase product plume.

The usage of extraction wells alone is best suited when: contaminates are miscible and move readily with the groundwater, the hydraulic gradient is steep, the hydraulic conductivity is high, and a quick cleanup is not necessary. These conditions are not present at the CORCO Facility. The best available technology for quick product removal at water table conditions is a combination of extraction and injection wells. The use of combined extraction and injection wells is recommended for sites were the hydraulic gradient is relatively flat and hydraulic conductivity is moderate to low (Fetter, 1990).

The use of pump systems are highly site specific. The aquifer characteristics, chemical characteristics and non-aqueous phase liquids (NAPLs) limit chemical and groundwater flow to extraction wells. The Ponce aquifer should be analyzed by numeric model before installing recovery wells and recovery systems to optimize recovery actions.

2.1 Groundwater Modeling

The water table at the CORCO Facility is acting under a number of structural influences from the Ponce Limestone formation. The hydraulic reactions are a potentiometric mounding and a hydraulic ridge. The use of computer modeling will allow insight into the controlling parameters of the water table at the CORCO Facility. The aquifer system dynamics will be formulated to improve understanding of the Ponce aquifer.

The modeling of the CORCO Facility aquifer will allow predictive applications to assess the consequences of proposed actions. The aquifer characteristics, physical and chemical subsurface system, and flow parameters for extraction wells can be analyzed at different locations and spacing of recovery wells. The pathline tracking model can be stimulated to optimize free-phase product recovery. The particle tracking model can be used to compute stream lines, travel times, and determine capture zones. CORCO recommends that a theoretical particle tracking model be used in selecting the placement, pump rate and spacing of recovery wells.

Equilibrium pumping is most often used for plume management systems, as it allows for greater well spacing. Non-equilibrium pumping is an alternative for aquifers with low hydraulic conductivity, sites with hydraulic barriers, and for non-miscible plume capture. Modeling will calculate the optimum pumpage rate for the greatest radii of influence under these circumstances. It is recommended that flow net modeling be used to analyze the Ponce Limestone water table acting under Equilibrium pumping and Non-equilibrium pumping.

Aquifer pumping alone is most effective at sites that have high inter-granular hydraulic conductivities. A combination of extraction and injection wells is the favored technique to remediate aquifers similar to the water table at the CORCO Facility which has a relatively flat gradient and moderate hydraulic conductivity. The function of the injection wells is to direct the product to the extraction wells. The extraction well arrangement must be engineered such that the radii of influence overlap, so the areas of slow groundwater movement is minimized. The greater the overlapping of influence radii - the smaller the dead spots. CORCO recommends modeling the efficacy of a combination of extraction and injection wells with respect to percent volume recoverable verses time.

2.2 Oil Recovery System Location

Free-phase product is located in five areas at the CORCO Facility. These five areas are: the MIS Area, the Tank Farm West Area, the Facility South Area, the Tank Farm Central Area, and the Process Area. CORCO recommends a mechanism for product recovery be installed in each of these areas.

The pattern and spacing of recovery wells will be site specific. The well spacing will be engineered so that the radii of influence overlap. This is an accurate recovery method for aquifers that have a low flow velocities. The spacing of wells will be closer when dealing with areas of the aquifer with high natural flow velocities. The pattern and spacing of the recovery wells will be determined by the model of the Ponce aquifer and the location will be outlined in the Phase II: Subsurface Oil Recovery Workplan.

Confined aquifers and unconfined aquifers do not respond the same during pumping. The radii of influence, for a confined aquifer, is not effected by increased pumping. The aquifer capacity is directly proportional to the drawdown as long as the aquifer is not de-watered. An unconfined aquifers maximum efficiency, for well operation, is at 67 percent of the maximum drawdown. The maximum efficiency, for the unconfined Ponce aquifer acting under water table conditions, will be determined by computer model.

2.3 Recovery System - Conceptual Design

CORCO recommends modeling of the Ponce aquifer to properly engineer the Phase II: Subsurface Oil Recovery Workplan. The design of the proposed product recovery systems should be based on theoretical values of the aquifer system and time required for product recovery. The recovery system design must address the following: the number and type of wells required, the pattern and spacing of the wells, the radius of influence of the wells, the required pumping rates, and whether equilibrium or non-equilibrium pumping will be used. Computer modeling of the aquifer will allow optimization of recover efforts at the facility.

The waters extracted from the aquifer can be used for control of the product plume. The recovered waters can be treated and used to enhance the groundwater control system as an aquifer recharge. This option will be assessed by computer model.

The pending recovery well systems will be designed so the area influenced by pumping from the wells totally encapsulates a plume. Major components of a well recovery system includes: multiple well points, suction wells, ejector wells, site specific above ground remediation components and all necessary support equipment to gauge system progress.

The main limitation of pump-and-treat technology is the time frame that is required to achieve acceptable levels of free-phase product recovery. The pump-and-treat system must be correctly engineered for the aquifer. Potential design failures include: a design that fails to capture the contaminate plume or operational failures that allow loss of contaminate. Typical operation failures are surface equipment, electrical control systems, mechanical control systems, chemical precipitation, well plugging, pump failure, and surface plumbing failure. It is by modeling of the aquifer that many of the recovery efforts can be optimized by limiting potential design failures. CORCO therefore recommends the Phase II: Subsurface Oil Recovery Workplan be based on modeling results of the the aquifer parameters.

2.3.1 Pump Test/Aquifer Test

The MIS product recovery system was expected to go on-line October 15, 1994. The recovery system start-up has been postponed due to possible lateral downhole movement of a clay formation. At present, the recovery system is expected to be on-line in early November 1994.

Hydraulic data will be collected during start up testing of the MIS product recovery system. The time, volumes produced, rate of production and draw-down will be measured. This data will be utilized to model and optimize recovery rates at the CORCO Facility.

The radius of influence is determined theoretically using aquifer characteristics. The aquifer characteristics can be estimated by "slug-test" or pump test methods. The pump test is the most accurate method for estimating an aquifers characteristics. The pumping tests will identify recharge boundaries, barrier boundaries, and slow storage release conditions. The pump test can also be used to determine equilibrium conditions. CORCO believes the data collected during the MIS Area recovery system start-up will supply sufficient radii of influence data for purposes of modeling. Additional slug tests may be performed at wells in the Ponce aquifer that do not contain free-phase product to establish more data points.

2.3.2 Recovery Wells Design

The depth to the water table is the limiting factor at the CORCO Facility for recovery well design. A recovery well designed with high horizontal and vertical strength properties is necessary for systems installed in the Ponce Limestone. The recovery well design should include:

- large diameter casing for pumps;
- heavy duty material for down-hole pressure; and

- screen size/gravel pack adequate for sediment size.

The selected well material should be gauged to last the expected period of time for recovery. At this time, CORCO recommends a minimum of sixty gauge PVC four inch well material be used for recovery wells. The Phase II: Subsurface Oil Recovery Workplan will detail construct materials, depth and screened interval.

2.3.3 Additional Piezometer Locations

The areas of free-phase product have been defined to the south, east, and west at the CORCO Facility. The area of product north of the Tank Farm Central Area has not been delineated. A minimum of two (2) or possibly three (3) additional piezometers is recommended for determining the presence of product in this area. The locations of the three piezometers north of the Tank Farm Central Area are as follows: area near Tank 1031, plateau east of Tank 1015, and the area east of Tank 724. CORCO recommends that installation of the delineation piezometers be postponed until after the static level measurements have been collected, the Ponce aquifer has been modeled and the Phase II: Subsurface Oil Recovery Workplan is constructed.

2.4 Proposed Time-Line

CORCO is actively installing a product recovery system to recover free-phase product at the MIS Area. CORCO is submitting a schedule for present and projected activities to recovery free-phase product at the CORCO Facility (refer to **Figure 14 - Time-Line; Phase II: Subsurface Oil Recovery Workplan**).

CORCO is presently installing a free-phase product recovery pump system at the MIS Area for product recovery. This system is expected to go on-line in early November 1994. CORCO believes the collected data from the MIS Area recovery operations should be evaluated to optimize recovery of product from all other areas containing product at the facility. The data collection from the MIS Recovery System will be finished in January 1995. The recovery data reduction is expected to be complete and a MIS Recovery Report submittal to the U.S. EPA, Region 2 in February 1995. CORCO recommends that an additional static level measurement program for the thirty-two (32) Phase I piezometers, six (6) MIS monitor wells, and eight (8) RCRA monitoring wells be initiated in February 1995. Data reduction, and data reportable is proposed to be completed in March 1995.

CORCO recommends the generation of the Phase II: Subsurface Oil Recovery Workplan be initiated following the second static level measurement program, data reduction and Modeling the hydraulic systems at the facility. The proposed workplan will detail the Oil Recovery Systems location, Recovery System design, and Recovery Well design.

The Subsurface Oil Recovery Workplan will include engineered specifications for product pump rate, percent product volume reduction calculations, and time required for product volume reduction.

The intent of the Phase II: Subsurface Oil Recovery Workplan is to optimize the recovery of the free-phase product at the CORCO Facility. CORCO believes that properly engineered product recovery systems will remove a greater percent of product in a shorter time period. This will reduce the potential impact to human health and further impact to the environment.

CORCO proposes to submit the Phase II: Subsurface Oil Recovery Workplan to the U.S. EPA, Region 2 for review in June 1995. Initiation of the Phase II: Workplan is presently projected to be in the first week of July 1995.

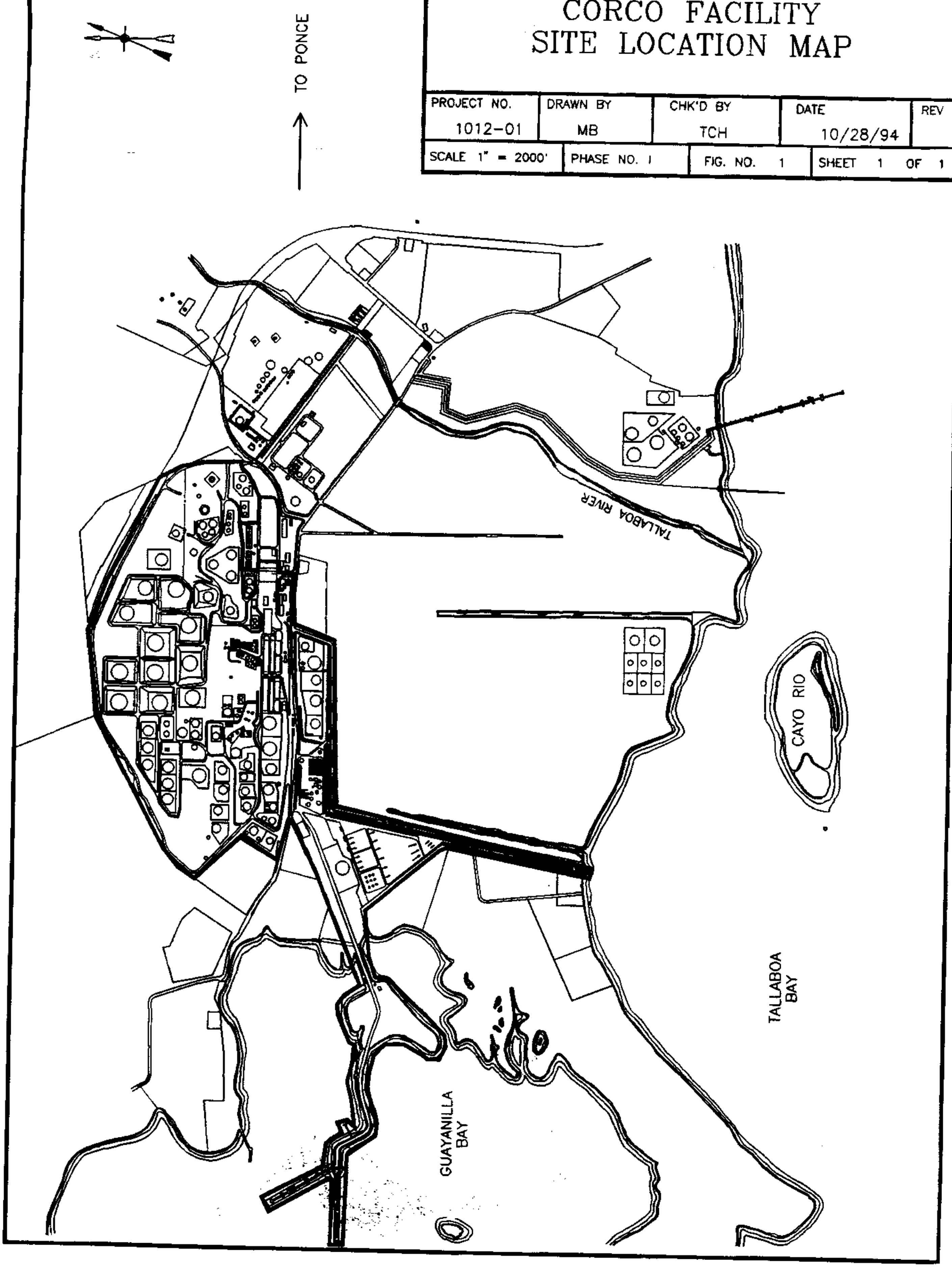
TABLE OF FIGURES

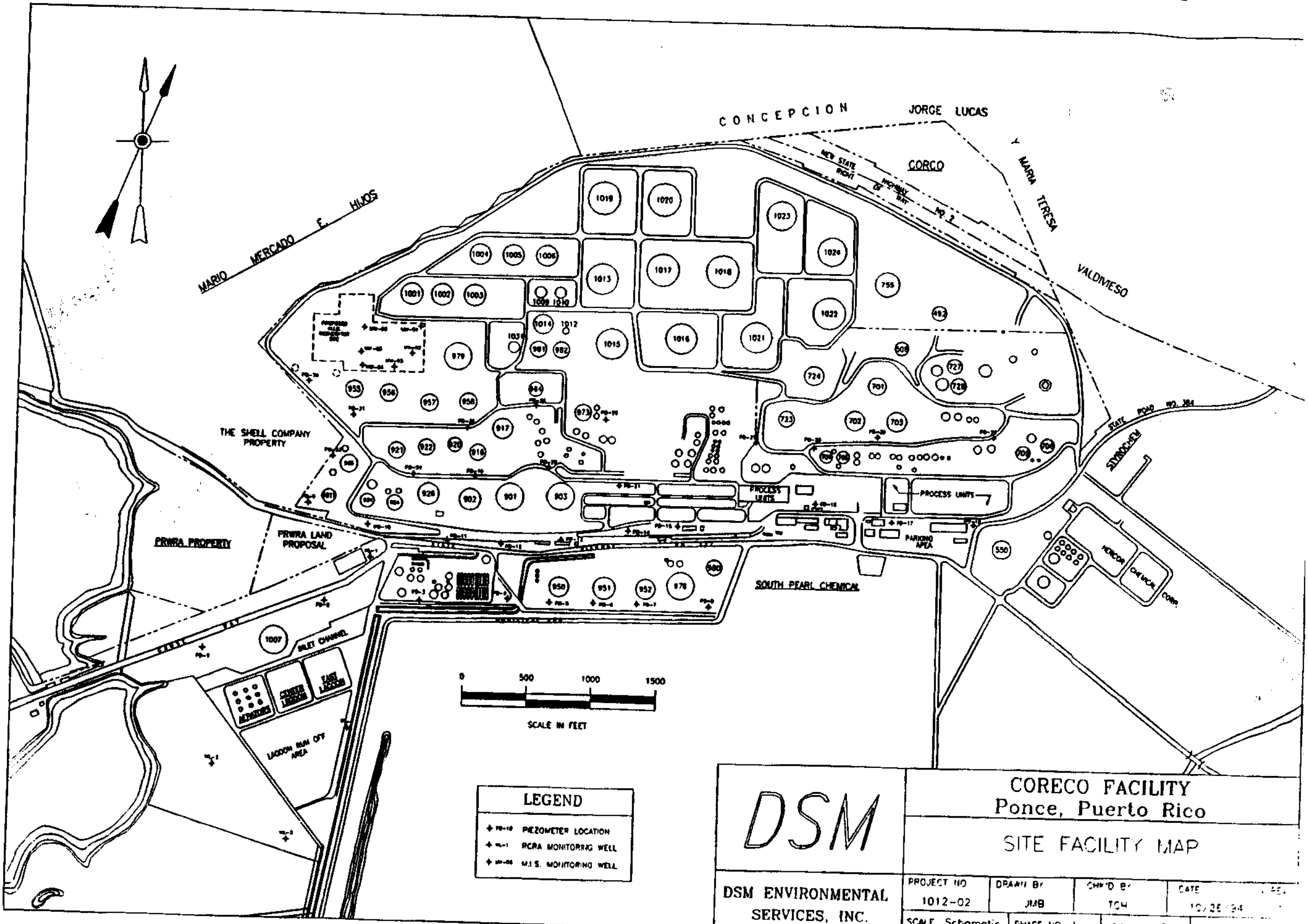
DSM Environmental Services, Inc.

CORCO FACILITY SITE LOCATION MAP

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1012-01	MB	TCH	10/28/94	

SCALE 1" = 2000'	PHASE NO. I	FIG. NO. 1	SHEET 1 OF 1





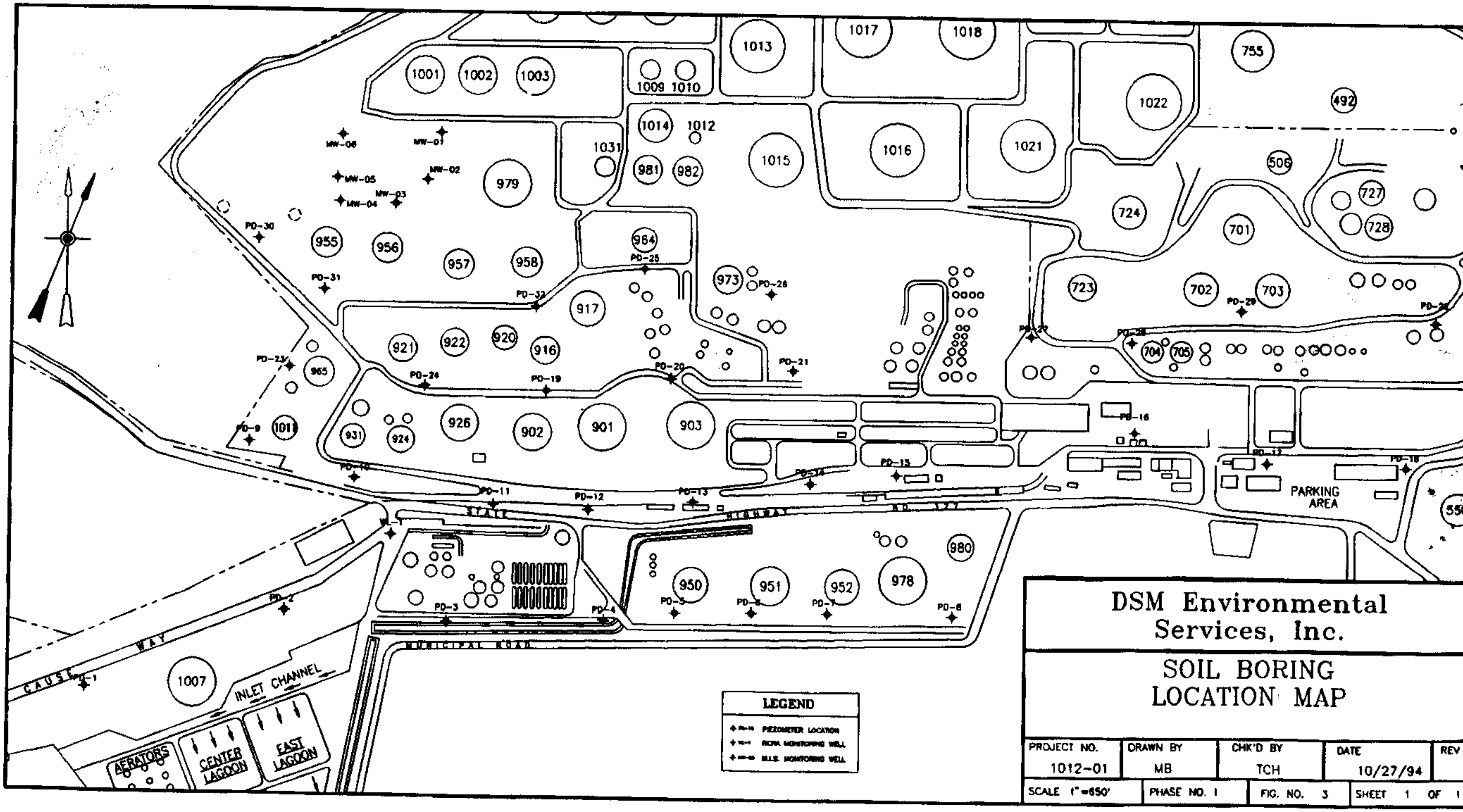
DSM

DSM ENVIRONMENTAL SERVICES, INC.

CORECO FACILITY
Ponce, Puerto Rico

SITE FACILITY MAP

PROJECT NO	DRAWN BY	CHK'D BY	DATE
1012-02	JMB	TCM	10/26/94
SCALE Schematic	PHASE NO 1	FIG NO 2	SHEET



DSM Environmental Services, Inc.

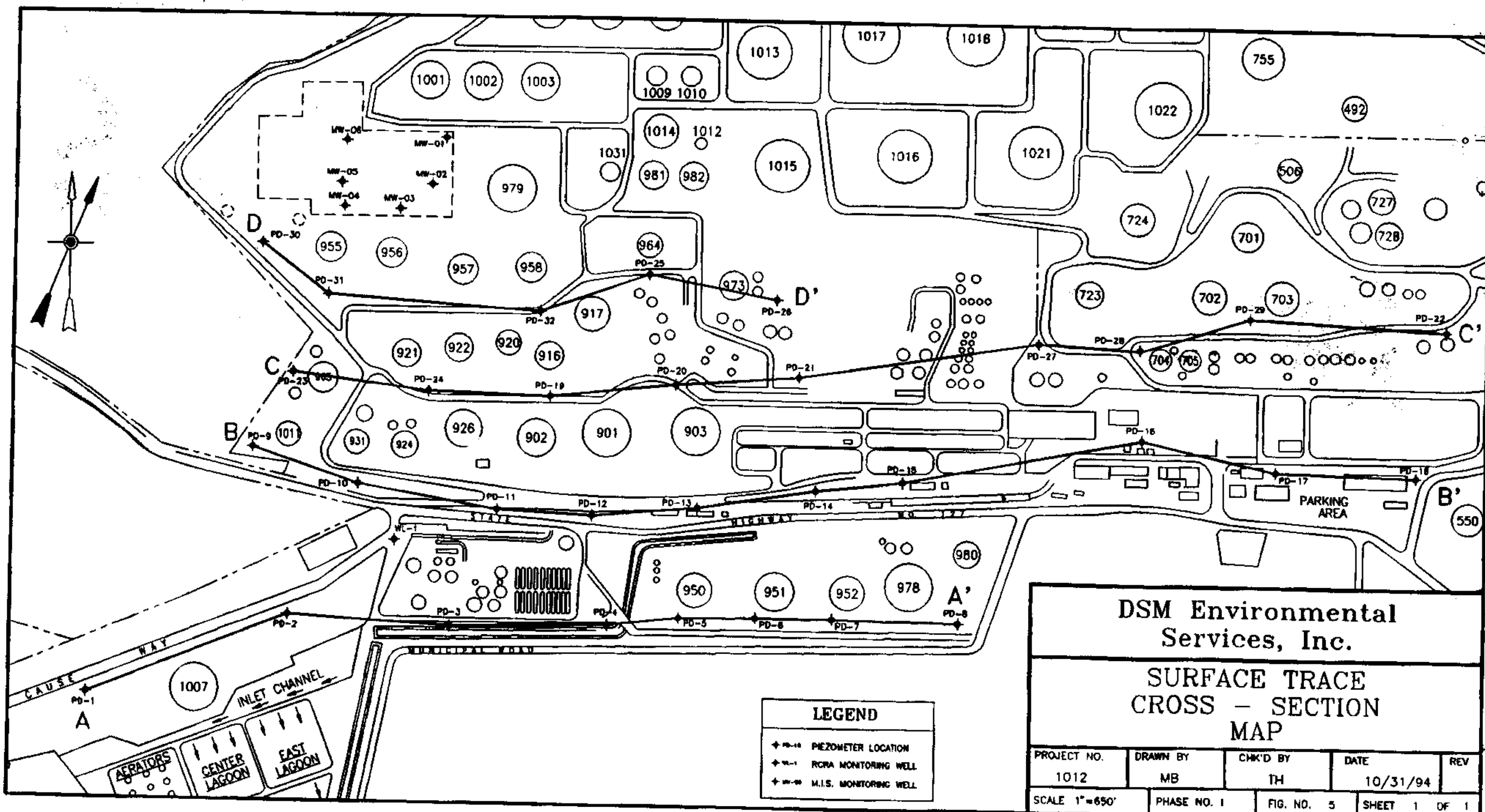
SOIL BORING LOCATION MAP

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1012-01	MB	TCH	10/27/94	
SCALE 1"=650'	PHASE NO. 1	FIG. NO. 3	SHEET 1 OF 1	

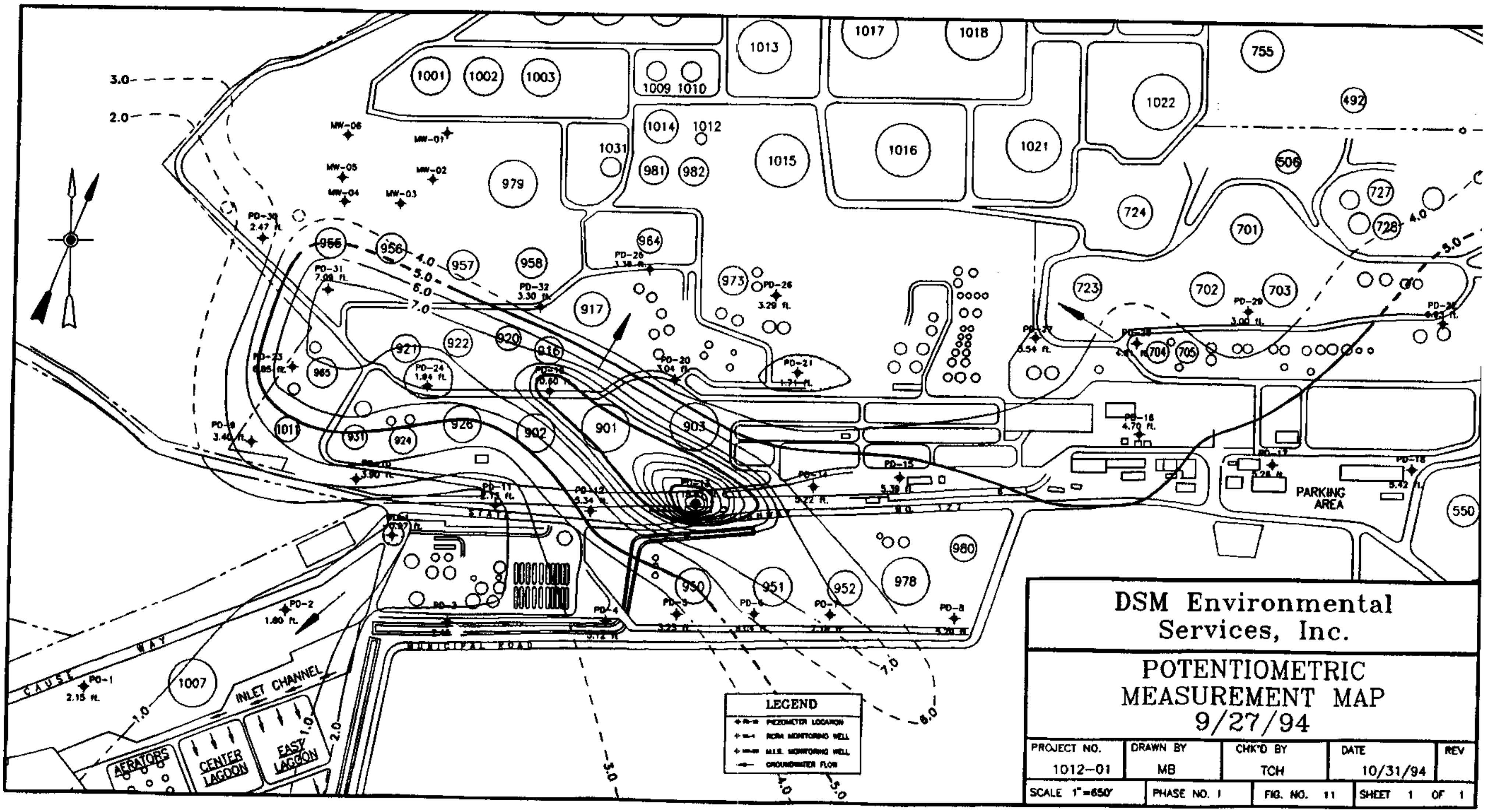
FIGURE 4

UNIFIED SOIL CLASSIFICATION SYSTEM

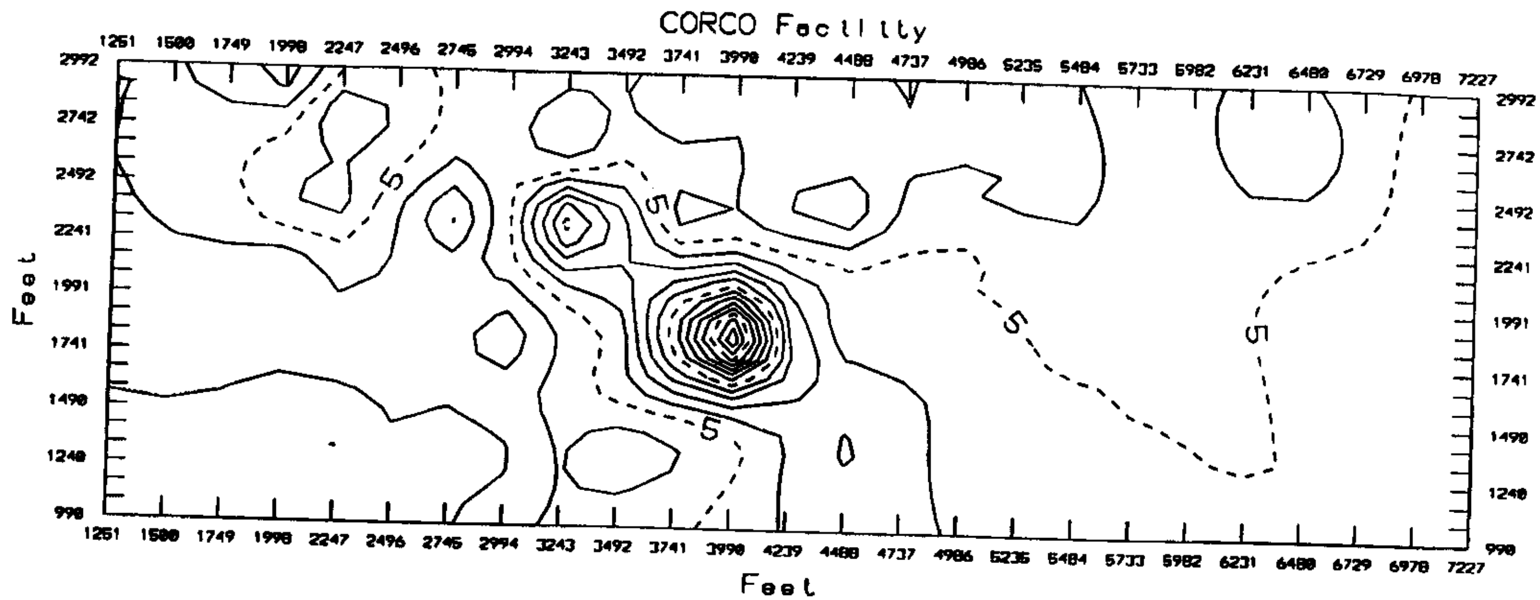
GRADATION AND PLASTICITY CHARACTERISTICS (Excluding Particles Larger Than 3 inches)				LABORATORY CONFIRMATION	GROUP SYMBOL	SOIL NAMES
PREDOMINANTLY COARSE-GRAINED >50% of Grains Larger Than 0.75mm	GRAVEL >50% of Course Grains Larger Than 4.76 mm	CLEAN <5% Fines		D60/D10 > 4	GW	Well Graded GRAVEL or SANDY GRAVEL
				Not Meeting Gradation Requirements for GW	GP	Poorly graded, uniform, or gap-graded GRAVEL or SANDY GRAVEL
		WITH FINES >5% Fines		Atterberg Limits Below A-Line OR PI<4	GM	SILTY GRAVEL
				Atterberg Limits Above A-Line AND PI>7	GC	CLAYEY GRAVEL
	SAND >50% of Course Grains Smaller Than 4.76 mm	CLEAN <5% Fines		D60/D10 > 4	SW	Well-Graded SAND or GRAVELLY SAND
				Not Meeting Gradation Requirements for SW	SP	Poorly graded, uniform, or gap-graded SAND or GRAVELLY SAND
		WITH FINES <5% Fines		Atterberg Limits Below A-Line OR PI<4	SM	SILTY SAND
				Atterberg Limits Above A-Line AND PI>7	SC	CLAYEY SAND
PREDOMINANTLY FINE-GRAINED >50% of Grains Less Than 0.075mm	Plasicity Characteristics of fraction Larger Than 0.425mm	SILT Atterberg Limits below A-line or PI<4	INORGANIC	Liquid Limit<50	ML	Nonplastic, slightly plastic, or moderately plastic SILT, CLAYEY SILT, SANDY SILT,or GRAVELLY SILT
				Liquid Limit>50	MH	Highly plastic or moderately plastic SILT, CLAYEY SILT, SANDY SILT,or GRAVELLY SILT
			ORGANIC	Liquid Limit<50	OL	Slightly plastic or moderately plastic ORGANIC SILT (ORGANIC CLAY if Atterberg Limits above A-line)
				Liquid Limit>50	OH	Highly plastic or Very Highly plastic ORGANIC SILT (ORGANIC CLAY if Atterberg Limits above A-line)
		CLAY Atterberg Limits above A-line AND PI>7		Liquid Limit<50	CL	Slightly plastic, or moderately plastic CLAY, SILTY CLAY, SANDY CLAY,or GRAVELLY CLAY
				Liquid Limit>50	CH	Highly plastic or moderately plastic SILT, CLAYEY SILT, SANDY SILT,or GRAVELLY SILT
HIGHLY ORGANIC (identified by spongy feel)					Pt	PEAT



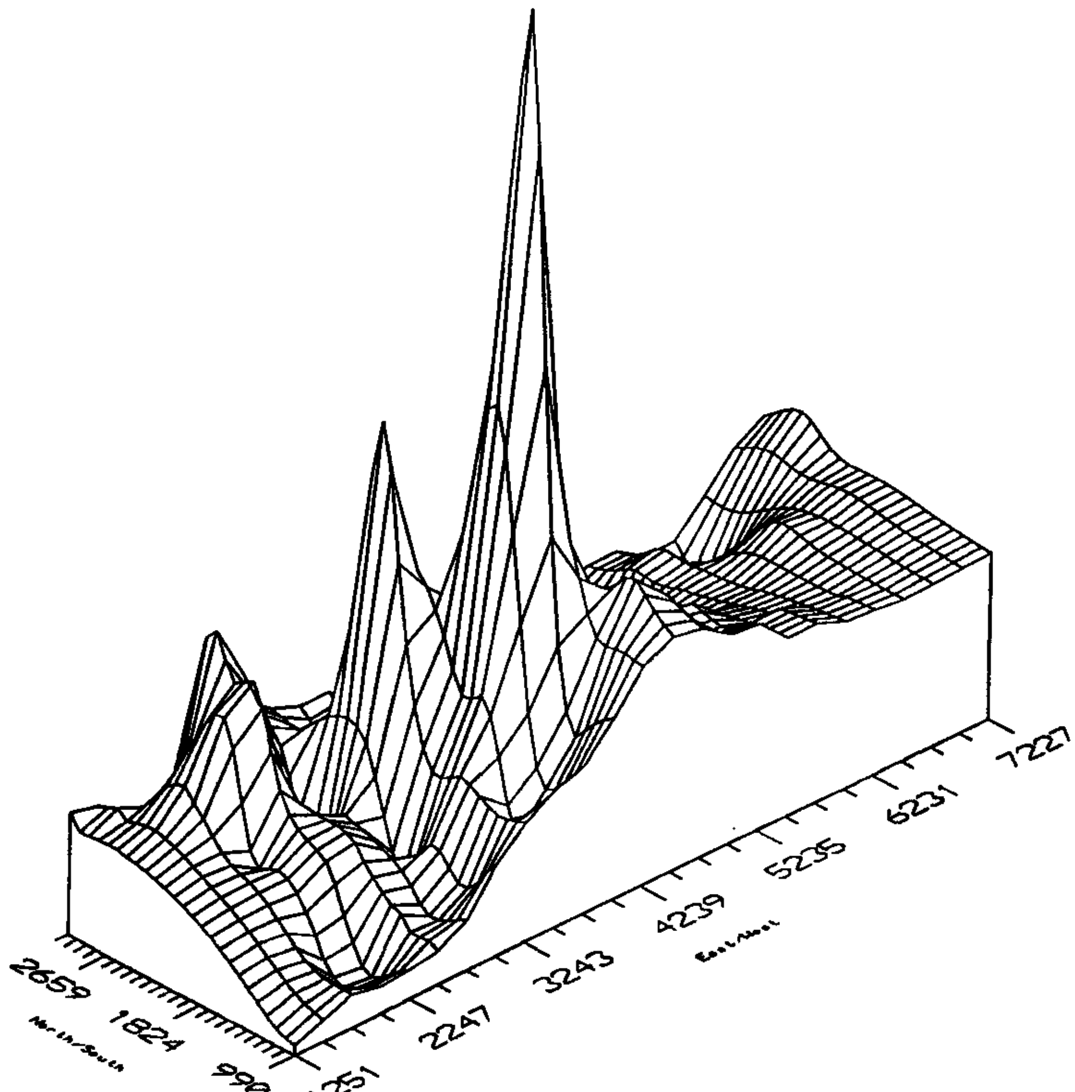
DSM Environmental Services, Inc.
SURFACE TRACE CROSS - SECTION MAP
PROJECT NO. 1012
DRAWN BY MB
CHK'D BY TH
DATE 10/31/94
REV
SCALE 1"=650'
PHASE NO. 1
FIG. NO. 5
SHEET 1 OF 1
LEGEND
PIEZOMETER LOCATION
RCRA MONITORING WELL
M.I.S. MONITORING WELL
A
A'
B
B'
C
C'
D
D'
PD-1
PD-2
PD-3
PD-4
PD-5
PD-6
PD-7
PD-8
PD-9
PD-10
PD-11
PD-12
PD-13
PD-14
PD-15
PD-16
PD-17
PD-18
PD-19
PD-20
PD-21
PD-22
PD-23
PD-24
PD-25
PD-26
PD-27
PD-28
PD-29
PD-30
PD-31
PD-32
MW-01
MW-02
MW-03
MW-04
MW-05
MW-06
WL-1
PARKING AREA
STATE HIGHWAY NO. 127
MUNICIPAL ROAD
CAUSEWAY
INLET CHANNEL
AERATORS
CENTER LAGOON
EAST LAGOON


DSM Environmental Services, Inc.
POTENTIOMETRIC MEASUREMENT MAP
9/27/94
PROJECT NO. 1012-01
DRAWN BY MB
CHK'D BY TCH
DATE 10/31/94
REV
SCALE 1"=650'
PHASE NO. I
FIG. NO. 11
SHEET 1 OF 1
LEGEND
PIEZOMETER LOCATION
RCRA MONITORING WELL
M.I.S. MONITORING WELL
GROUNDWATER FLOW
PARKING AREA
INLET CHANNEL
AERATORS
CENTER LAGOON
EAST LAGOON
CAUSEWAY
MUNICIPAL ROAD
PD-1 2.15 ft.
PD-2 1.80 ft.
PD-30 2.47 ft.
PD-31 7.09 ft.
PD-32 3.30 ft.
PD-26 3.29 ft.
PD-24 1.84 ft.
PD-19 3.40 ft.
PD-23 6.85 ft.
PD-18 4.70 ft.
PD-27 5.54 ft.
PD-29 3.00 ft.
PD-11 2.15 ft.
PD-12 5.34 ft.
PD-14 5.22 ft.
PD-4 5.72 ft.
PD-5 3.23 ft.
PD-8 5.20 ft.
MW-01
MW-02
MW-03
MW-04
MW-05
MW-06

Potentiometric Measurement Map

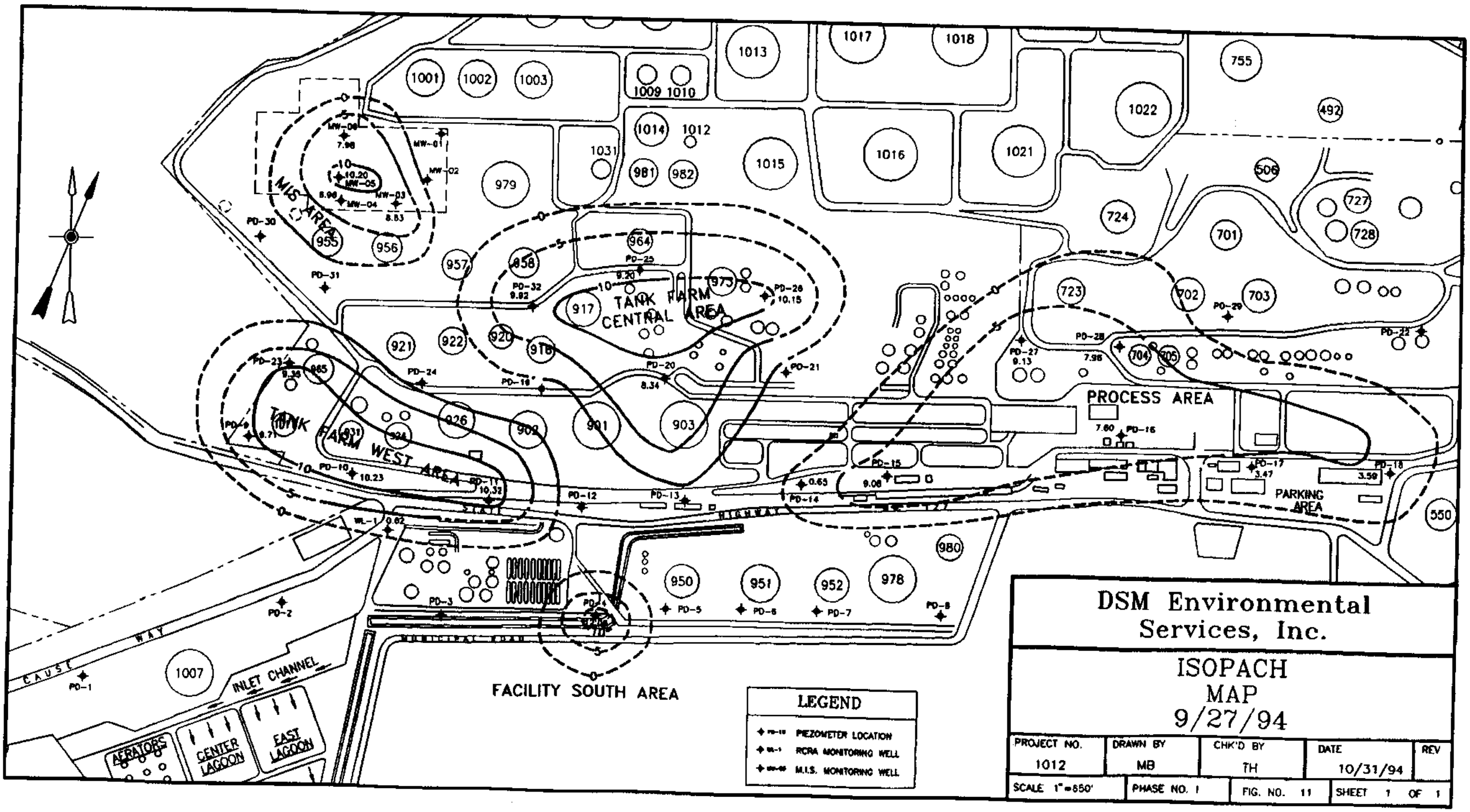


DSM Environmental Services, Inc.				
X-Y POTENTIOMETRIC MEASUREMENT MODEL				
PROJECT NO. 1012-02	DRAWN BY TCH	CHK'D BY TCH	DATE 10/28/94	REV
SCALE Schematic	PHASE NO. 1	FIG. NO. 11	SHEET 1 OF 1	



Potentiometric Measurement Map

DSM Environmental Services, Inc.				
XY-Z POTENTIOMETRIC MEASUREMENT MODEL				
PROJECT NO. 1012-02	DRAWN BY TCH	CHK'D BY TCH	DATE 10/28/94	REV
SCALE Schematic	PHASE NO. I	FIG. NO. 12	SHEET 1 OF 1	



TANK FARM CENTRAL AREA
TANK FARM WEST AREA
MIS AREA
PROCESS AREA
PARKING AREA
FACILITY SOUTH AREA
STATE HIGHWAY 127
MUNICIPAL ROAD
CAUSE WAY
INLET CHANNEL
AERATORS
CENTER LAGOON
EAST LAGOON
LEGEND
PIEZOMETER LOCATION
RCRA MONITORING WELL
M.I.S. MONITORING WELL
DSM Environmental Services, Inc.
ISOPACH MAP 9/27/94
PROJECT NO. 1012
DRAWN BY MB
CHK'D BY TH
DATE 10/31/94
REV
SCALE 1"=850'
PHASE NO. I
FIG. NO. 11
SHEET 1 OF 1

Task Outline

11-04-94

FIGURE 14 - TIME-LINE
Phase II: Subsurface Oil Recovery Workplan
CORCO Facility, Penuelas, Puerto Rico

Project: 1012-02

Revision: 3

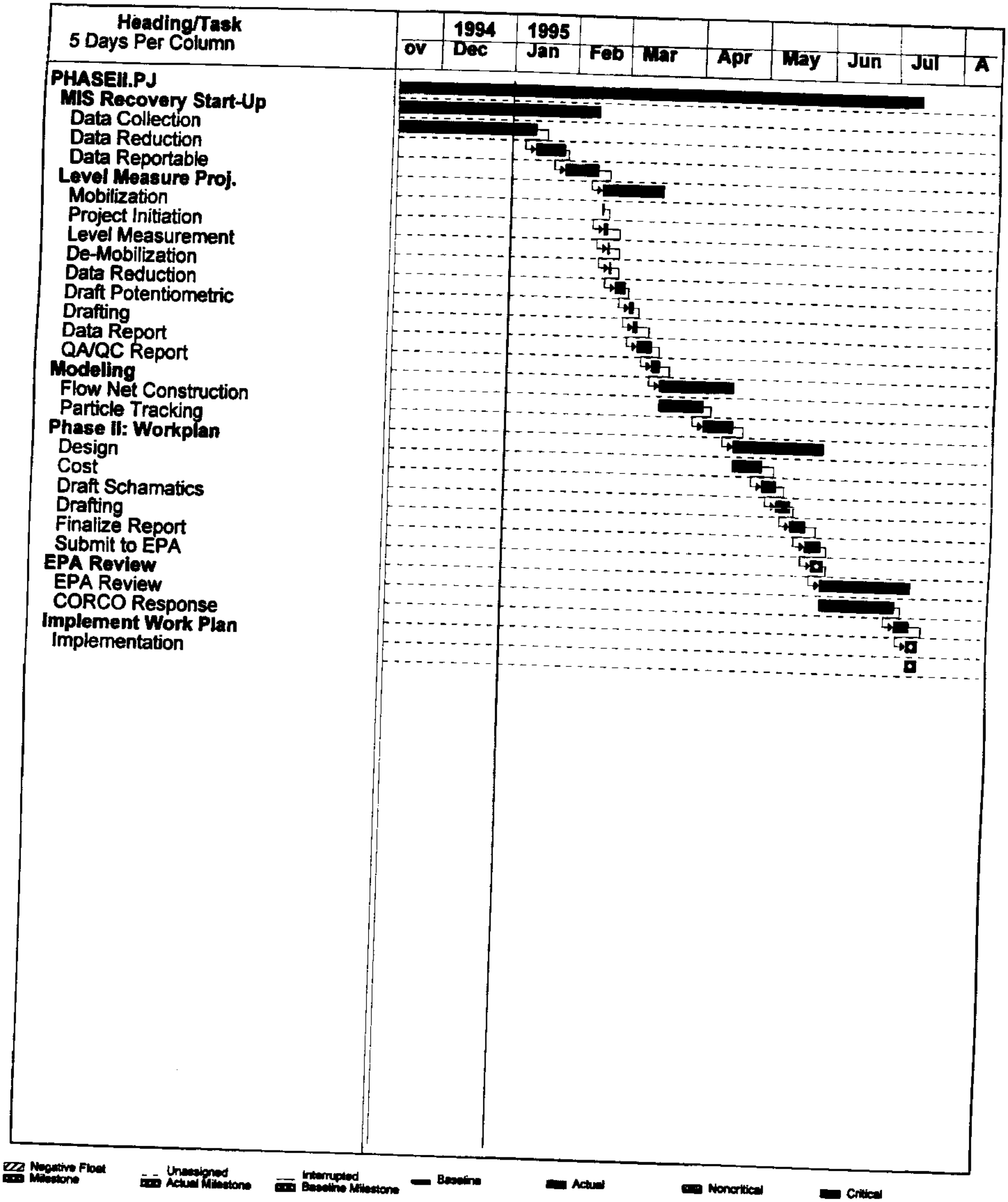


TABLE OF TABLES

TABLE 1

FREE-PRODUCT THICKNESS IN THE MIS AREA MONITORING WELLS MEASURED MARCH, 1994 CORCO FACILITY, PONCE P.R.

WELL NUMBER	MEASURED FREE-PHASE PRODUCT THICKNESS (ft.)
MW-01	ND
MW-02	ND
MW-03	9.30
MW-04	6.74
MW-05	7.69
MW-06	8.54

TABLE 2

Collected Soil Samples
Phase I: Subsurface Oil Investigation
CORCO Facility, Ponce P.R.

No.	PD-4	PD-9	PD-10	PD-11	PD-12	PD-13	PD-14	PD-15	PD-16	PD-17	PD-18	PD-19	PD-20	PD-21	PD-22	PD-23
3	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	10-12	
4					15-17	15-17	15-17	15-17	15-17	15-17		15-17	15-17	15-17		
5		20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	20-22	
6	16-18		25-27		25-27		25-27	25-27	25-27	25-27		25-27		25-27		
7		30-32	30-32	30-32	27-29	24-26	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	30-32	
8	20-22		35-37	35-37	29-31			35-37	35-37		35-37	35-37	35-37		35-37	
9		40-42					34-36		40-42	44-46				40-42		
10			39-41	39-41	33-35		36-38	39-41			39-41	45-47				
11		50-52			35-37			41-43	50-52		44-46	50-52	50-52	50-52	50-52	
12		55-57					40-42									
13		60-62	45-47	45-47	40-42							60-62	60-62	60-62	60-62	
14																
15												70-72	70-72	70-72	70-72	
16		66-68														
17												80-82	80-82	80-82		
18												85-87		85-87	85-87	
19												90-92	90-92	90-92		
20													95-97			
21												100-102		100-102	100-102	
22															105-107	
23														110-112		
24																
25																
26															125-127	
27														130-132		
28															135-137	
29																
30																
31															150-152	
32															155-157	
33																
34																
35															170-172	
36																
37																
38															185-187	

TABLE 3

Piezometer Installation Dates, Depth, and Indications of Product

DATE Installed	PIEZOMETER No.	DEPTH	Indication of Product	Confirmed Product 09/27/94
5/12/94	PD-8	25′ bls		
5/16/94	PD-7	25′ bls		
5/17/94	PD-6	25′ bls		
5/17/94	PD-5	25′ bls		
5/18/94	PD-4	25′ bls	Free-Phase	12.06 ft.
5/20/94	PD-3	25′ bls		
5/20/94	PD-2	25′ bls		
5/24/94	PD-1	25′ bls		
5/25/94	PD-9	71′ bls	Free-Phase	9.71 ft.
5/26/94	PD-10	48′ bls	Free-Phase	10.23 ft.
5/27/94	PD-11	53′ bls	Free-Phase	10.32 ft.
6/1/94	PD-12	42′ bls	Free-Phase	Non-Detect
6/2/94	PD-13	28′ bls		
6/2/94	PD-14	43′ bls	Free-Phase	0.65 ft.
6/3 - 6/7/94	PD-16	52′ bls	Free-Phase	7.60 ft.
6/8/94	PD-15	45′ bls	Free-Phase	9.08 ft.
6/8 - 6/9/94	PD-17	45′ bls	Free-Phase	3.47 ft.
6/9 - 6/10/94	PD-18	45′ bls	Free-Phase	3.59 ft.
6/13 - 6/17/94	PD-30	107′ bls	Free-Phase	Non-Detect
6/20 - 6/22/94	PD-23	104′ bls	Free-Phase	9.35 ft.
6/22 - 6/24/94	PD-19	105′ bls		
6/22 - 6/24	PD-31	117′ bls	Free-Phase	Non-Detect
6/24 - 6/29/94	PD-24	147′ bls		
6/27 - 7/7/94	PD-32	175′ bls	Free-Phase	9.92 ft.
6/29 - 7/1/94	PD-20	105′ bls	Free-Phase	8.34 ft.
7/5 - 7/8/94	PD-25	160′ bls	Free-Phase	9.20 ft.
7/8 - 7/12/94	PD-26	180′ bls	Free-Phase	10.15 ft.
7/9 - 7/14/94	PD-21	140′ bls		
7/14 - 7/15/94	PD-28	100′ bls	Free-Phase	7.96 ft.
7/19 - 7/19/94	PD-29	135′ bls	Free-Phase	Non-Detect
7/9 - 7/21/94	PD-27	135′ bls	Free-Phase	9.13 ft.
7/9 - 7/22/94	PD-22	190′ bls		

′ bls (feet below-land-surface)

TABLE 4

LIQUID LEVEL MEASUREMENTS
Phase I: Subsurface Oil Investigation
Commonwealth Oil Refining Company
Penuelas, Puerto Rico

WELL No.	Date Sampled	Casing Elevation (feet)[1]	Depth to PSH (feet)	Depth to Water (feet)	PSH Thickness (feet)	Corrected Water Level (feet)[2]
MW-01	09/27/94		NA	NA	0.00	
MW-02	09/27/94		ND	177.39	0.00	
MW-03	09/27/94		169.42	178.05	8.63	
MW-04	09/27/94		166.96	173.92	6.96	
MW-05	09/27/94		162.52	172.72	10.20	
MW-06	09/27/94		165.58	173.56	7.98	
EL-1	03/11/94	15.29	ND	9.88	0.00	5.41
	09/27/94		ND	10.07	0.00	5.22
EL-2	03/11/94	17.28	ND	16.34	0.00	0.94
	09/27/94		ND	16.26	0.00	1.02
EL-3	03/11/94	10.10	ND	9.35	0.00	0.75
	09/27/94		ND	9.21	0.00	0.89
EL-4	03/11/94	10.79	ND	10.75	0.00	0.04
	09/27/94		ND	11.61	0.00	-0.82
WL-1	03/11/94	8.03	ND	8.80	0.00	-0.77
	09/27/94		8.84	9.46	0.62	-0.87
WL-2	03/11/94	10.28	ND	9.64	0.00	0.64
	09/27/94		ND	9.37	0.00	0.91
WL-3	03/11/94	8.22	ND	6.93	0.00	1.29
	09/27/94		ND	6.71	0.00	1.51
WL-4	03/11/94	7.29	ND	5.40	0.00	1.89
	09/27/94		ND	5.19	0.00	2.10
PD-1	09/27/94	7.51	ND	5.36	0.00	2.15
PD-2	09/27/94	11.71	ND	9.91	0.00	1.80
PD-3	09/27/94	10.40	ND	7.94	0.00	2.46
PD-4	09/27/94	11.35	7.03	19.09	12.06	3.12
PD-5	09/27/94	8.86	ND	5.63	0.00	3.23
PD-6	09/27/94	11.25	ND	5.21	0.00	6.04

TABLE 4 (Continued)
Liquid Level Measurements

WELL No.	Date Sampled	Casing Elevation (feet)[1]	Depth to PSH (feet)	Depth to Water (feet)	PSH Thickness (feet)	Corrected Water Level (feet)[2]
PD-7	09/27/94	12.83	ND	5.65	0.00	7.18
PD-8	09/27/94	14.47	ND	9.18	0.00	5.29
PD-9	09/27/94	56.76	52.39	62.10	9.71	3.40
PD-10	09/27/94	39.86	34.94	45.17	10.23	3.90
PD-11	09/27/94	34.29	31.12	41.44	10.32	2.13
PD-12	09/27/94	32.74	ND	27.40	0.00	5.34
PD-13	09/27/94	33.53	ND	14.72	0.00	18.81
PD-14	09/27/94	35.27	29.99	30.64	0.65	5.22
PD-15	09/27/94	34.52	28.22	37.30	9.08	5.39
PD-16	09/27/94	40.68	35.22	42.82	7.60	4.70
PD-17	09/27/94	35.83	30.22	33.69	3.47	5.26
PD-18	09/27/94	39.04	33.26	36.85	3.59	5.42
PD-19	09/27/94	93.67	ND	83.07	0.00	10.60
PD-20	09/27/94	81.30	85.77	77.43	8.34	3.04
PD-21	09/27/94	98.30	ND	96.59	0.00	1.71
PD-22	09/27/94	168.25	ND	162.32	0.00	5.93
PD-23	09/27/94	93.38	85.59	94.94	9.35	6.85
PD-24	09/27/94	103.29	ND	101.35	0.00	1.94
PD-25	09/27/94	143.81	139.51	148.71	9.20	3.38
PD-26	09/27/94	163.43	159.12	169.27	10.15	3.29
PD-27	09/27/94	129.11	124.65	133.78	9.13	3.54
PD-28	09/27/94	83.70	78.09	86.05	7.96	4.81
PD-29	09/27/94	112.57	ND	109.57	0.00	3.00
PD-30	09/27/94	83.57	ND	81.10	0.00	2.47
PD-31	09/27/94	122.94	ND	115.85	0.00	7.09
PD-32	09/27/94	158.44	154.15	164.07	9.92	3.30

NOTE: ND = NON-DETECTED (NO IMMISCIBLE LAYER MEASURED)
(1) Referenced to mean sea level. Benchmark Located at CORCO Facility.
(2) Product specific gravity of 0.90 was used to calculate corrected ground water elevation.

TABLE 5

IN-SITU OIL MASS-BALANCE
COMMONWEALTH OIL REFINING COMPANY
Penuelas, PUERTO RICO

M.I.S. Area

Contour	Perimeter Area	Area (sq. ft.)	Average Depth	Volume (cu. ft.)	Approximate Gallons	Approximate barrels
0	437,015	236,034	2.5	590,085	1,324,239	31,530
5	200,981	178,449	7.5	1,338,368	3,003,497	71,512
10	22,532	22,532	10	225,320	505,652	12,039
TOTAL						83,551

Tank Farm West Area

Contour	Perimeter Area	Area (sq. ft.)	Average Depth	Volume (cu. ft.)	Approximate Gallons	Approximate barrels
0	1,114,134	422,727	2.5	1,056,818	2,371,657	56,468
5	691,407	364,029	7.5	2,730,218	6,127,018	145,881
10	327,378	310,324	10	3,103,240	6,964,136	165,813
TOTAL						311,694

Facility South Area

Contour	Perimeter Area	Area (sq. ft.)	Average Depth	Volume (cu. ft.)	Approx. Gal.	Approximate barrels
0	181,321	119,086	2.5	297,715	668,117	15,908
5	62,235	50,699	7.5	380,243	853,321	20,317
10	11,536	11,536	10	115,360	258,885	6,164
TOTAL						26,481

Tank Farm Central Area

Contour	Perimeter Area	Area (sq. ft.)	Average Depth	Volume (cu. ft.)	Approximate Gallons	Approximate barrels
0	1,465,361	595,227	2.5	1,488,068	3,339,447	79,511
5	870,134	636,818	7.5	4,776,135	10,718,363	255,199
10	233,316	233,316	10	2,333,160	5,235,961	124,666
TOTAL						379,865

Process Area

Contour	Perimeter Area	Area (sq. ft.)	Average Depth	Volume (cu. ft.)	Approximate Gallons	Approximate barrels
0	2,269,499	1,189,887	2.5	2,974,718	6,675,712	158,946
5	1,079,612	1,045,098	7.5	7,838,235	17,590,175	418,814
TOTAL						577,759
TOTAL APPROXIMATE VOLUME (Barrels)						1,379,351

TABLE 6

PRODUCT CHARACTERIZATION
COMMONWEALTH OIL REFINING COMPANY
Penuelas, PUERTO RICO

Well No.	PD-4	PD-9	PD-10	PD-11	PD-14	PD-15	PD-16	PD-17	PD-18	PD-20	PD-25	PD-26	PD-27	PD-28	PD-29	PD-32
Sample Date	5/18/94	5/25/94	5/26/94	5/31/94	6/2/94	6/8/94	6/9/94	6/9/94	6/10/94	7/1/94	7/8/94	7/13/94	7/21/94	7/14/94	7/21/94	7/7/94
Distillation																
IBP	310	220	196	140	166	204	110	128	100	178	220	230	120	100	100	174
5%	370	246	236	194	196	238	136	156	114	212	240	256	156	120	120	214
10%	420	260	246	212	200	248	146	170	120	224	250	270	174	128	128	226
20%	458	276	268	242	210	264	160	186	124	238	268	288	198	140	138	240
30%	478	284	280	266	216	274	176	202	130	254	286	308	216	154	150	254
40%	496	306	292	236	230	282	194	222	136	266	308	330	240	172	162	262
50%	514	324	304	306	254	292	212	246	146	276	328	378	256	196	182	294
60%	530	352	324	326	272	302	238	266	158	284	366	430	270	224	210	290
70%	550	392	360	366	286	320	264	280	178	294	428	480	282	250	252	304
80%	578	464	444	456	296	394	284	296	216	318	494	530	292	274	274	324
90%	622	558	538	560	350	518	300	328	278	440	614	660	316	296	280	424
95%	670	622	638	640	466	622	334	412	308	540	670	708	410	320	286	520
E.P.	690	642	640	676	546	625	438	572	414	590		710	486	398	332	590
REC.																
RES.																
Loss																
R.V.P.	0.0	0.5	1.2	2.8	2.1	1.0	5.6	3.9	9.7	1.3	6.0	0.7	3.4	8.0	8.1	1.7
API Gravity @ 60°F	32.7	39.0	37.9	40.9	34.1	36.0	56.5	50.3	71.6	40.4	40.2	35.9	44.8	58.7	60.8	42.8
Sulfur Wt. %	0.33	0.34	0.24	0.33	0.08	0.13	0.001	0.02	0.001	0.10	0.37	0.51	0.01	0.02	0.001	0.10
Aromatics Vol. %	32.3	48.3	56.6	47.0	82.1	66.8	37.1	45.2	15.6							
Benzene, Wt. %	N/A	N/A	N/A	3.10	34.70	N/A	5.16	2.34	2.10							
Heating Value Gross, BTU/Lb.										19759.4						19870.6

APPENDICES

APPENDIX A

- Survey Notes

	y	x	Plat form Elev.	Pipe Elev	Ground Elev.
PD-1	301.38	295.82	1.56	2.29	1.43
PD-2	456.58	681.59	3.01	3.57	2.86
PD-3	410.46	902.32	2.53	3.17	2.38
PD-4	417.89	1004.30	2.71	3.46	2.59
PD-5	403.48	1182.41	2.03	2.40	1.90
PD-6	406.81	1300.04	2.84	3.43	2.74
PD-7	414.26	1388.33	3.27	3.91	3.17
PD-8	415.63	1537.83	3.70	4.41	3.61
PD-9	662.77	612.47	16.54	17.30	16.35
PD-10	602.46	780.30	11.28	12.15	11.14
PD-11	593.14	951.41	10.06	10.55	9.94
PD-12	573.80	1050.47	9.20	9.98	9.01
PD-13	587.73	1235.55	9.23	10.22	9.22
PD-14	593.56	1394.04	9.97	10.75	9.97
PD-15	608.29	1550.64	10.54	10.52	10.54
PD-16	692.08	1767.30	11.56	12.40	11.41
PD-17	623.10	1990.58	10.03	10.82	9.98
PD-18	642.92	2180.29	11.00	11.90	South-10.75 North-11.02
PD-19	751.68	991.07	27.75	28.55	South- 27.68 North- 28.05
PD-20	763.37	1145.57	24.20	24.78	24.72
PD-21	773.16	1335.96	29.26	29.96	28.93
PD-22	851.97	2218.94	50.20	51.28	50.05
PD-23	780.15	664.60	27.66	28.46	27.51
PD-24	726.42	839.25	30.74	31.48	30.61
PD-25	912.29	1139.82	43.02	43.83	42.88
PD-26	900.15	1318.92	49.09	49.81	48.99
PD-27	852.58	1609.61	38.88	39.35	38.72
PD-28	866.00	1728.71	24.80	25.51	24.67

	Y	X	Platform Elev.	Pipe Elev	Ground Level
PD-29	865.77	1394.81	33.63	34.31	33.41
PD-30	944.44	576.45	24.76	25.47	24.59
PD-31	863.82	604.37	36.70	37.47	36.51
PD-32	848.46	365.68	47.62	48.29	47.38

25 Oct 94

Location of 32 Product Delineation Piezometers in the Corco Property. The Rectangular Coordinates are in Meters and on the Corco Grid. The elevations are in Meters above M.S.L. Where the ground is steep two Elevations are given, one South & the other North of the concrete Platform.

Pedro P. Rinaldi
BSME Lic No. 2109

APPENDIX B

- Sieve and Hydrometer Analyses
- Boring Log/Well Forms for Monitor Wells MW-1 through MW-6
- Boring Log/Well Forms for Monitor Wells EL-1 through EL-4
- Boring Log/Well Forms for Monitor Wells WL-1 through WL-5
- Boring Log/Well Forms for Piezometer Wells PD-1 through PD-32

PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
EL-1		8'-10'	2.6	60.8	36.6	15.2	21.4
EL-1		14'-16'	45.2	18.0	36.8	-	-
4	6	16'-18'	0.0	1.7	98.3	-	-
4	8	20'-22'	2.8	45.8	51.4	-	-
9	3	10'-12'	29.0	23.7	47.3	-	-
9	5	20'-22'	19.6	24.4	56.0	-	-
9	7	30'-32'	14.7	32.7	52.6	-	-
9	9	40'-42'	9.5	30.6	59.9	-	-
9	10	45'-47'	49.2	5.5	45.4	-	-
10	3	10'-12'	74.8	8.0	17.2	-	-
10	5	20'-22'	24.3	6.5	69.2	34.0	35.2
10	6	25'-27'	52.7	15.9	31.4	11.8	19.6
10	7	30'-32'	72.1	10.8	17.1	-	-
10	8	35'-37'	40.1	29.4	30.5	-	-
10	9	37'-39'	21.2	63.0	15.8	-	-
10	10	39'-41	2.0	27.1	70.9	-	-
10	11	41'-43'	14.9	38.7	46.4	28.3	18.1
10	12	43'-45'	4.2	32.9	62.9	22.9	40.0
10	13	45'-47'	47.0	27.4	25.6	-	-
11	2 & 3	5'-12'	37.0	50.5	12.5	-	-
11	5 & 6	25'-27'	35.2	44.3	20.5	-	-
11	7 & 8	30'-37'	12.3	24.5	63.2	30.5	32.7

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
11	10	39'-41'	32.3	36.9	30.8	-	-
11	13	45'-47'		N O	S A M P L E		
12	3	10'-12'	17.7	23.7	58.6	-	-
12	4	15'-17'	0.0	23.8	76.2	-	-
12	5	20'-22'	39.7	32.9	27.4	15.5	11.9
12	6	25'-27'	54.5	29.7	15.8	-	-
12	7	27'-29'	13.6	25.4	61.0	-	-
12	8	29'-31'	40.8	16.6	42.6	-	-
12	10	33'-35'	44.2	14.4	41.4	-	-
12	11	35'-37'	19.0	37.6	43.4	-	-
12	13	40'-42'	38.3	31.4	30.3	26.0	4.3
13	3	10'-12'	79.7	17.4	2.9	-	-
13	4	15'-17'	79.4	18.6	2.0	-	-
13	5	20'-22'	39.3	54.3	6.4	-	-
13	7	24'-26'	45.3	49.0	5.7	-	-
14	3	10'-12'	28.6	46.9	24.5	-	-
14	4	15'-17'	0.0	23.6	76.4	-	-
14	5	20'-22'	64.4	14.3	21.3	-	-
14	6	25'-27'	12.4	57.9	29.7	11.6	18.1
14	7	30'-32'	0.7	20.3	79.0	11.0	67.9
14	9	34'-36'	0.0	5.2	94.8	-	-
14	10	36'-38'	0.0	19.7	80.3	-	-

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
14	12	40'-42'	7.2	91.0	1.8	-	-
15	3	10'-12'	62.3	28.3	9.4	-	-
15	4	15'-17'	40.0	49.0	11.0	-	-
15	5	20'-22'	50.4	27.8	21.8	-	-
15	6	25'-27'		N O	S A M P L E		
15	7	30'-32'	9.4	55.6	35.0	-	-
15	8	35'-37'	82.1	10.4	7.5	-	-
15	10 & 11	39'-43'	45.0	25.2	29.8	3.3	26.5
16	3	10'-12'	16.4	1.9	81.7	52.1	29.6
16	4	15'-17'	30.2	27.7	42.1	16.9	25.2
16	5	20'-22'	73.7	10.5	15.8	-	-
16	6	25'-27'	68.8	16.3	14.9	-	-
16	7	30'-32'	43.7	7.3	49.0	25.2	23.8
16	8	35'-37'	61.0	10.7	28.3	10.9	17.4
16	9	40'-42'	29.0	45.3	25.7	-	-
16	11	50'-52'	41.4	4.4	54.2	8.7	45.5
17	3	10'-12'	17.7	45.5	36.8	-	-
17	4	15'-17'	51.0	19.8	29.2	-	-
17	5	20'-22'	52.9	29.7	17.4	-	-
17	6	25'-27'	23.8	50.5	25.7	-	-
17	7	30'-32'	7.4	58.5	34.1	-	-
17	9	44'-46'	19.8	30.3	49.9	-	-

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
18	3	10'-12'	23.1	47.5	29.4	-	-
18	5	20'-22'	5.0	32.2	62.8	-	-
18	7	30'-32'	44.9	21.5	33.6	-	-
18	8	35'-37'	70.6	20.4	9.0	-	-
18	9	39'-41'	53.8	11.0	35.2	-	-
18	9	39'-41'	17.8	36.7	45.5	-	-
18	11	44'-46'	13.5	47.3	39.2	-	-
19	3	10'-12'	72.8	8.0	19.2	-	-
19	4	15'-17'	65.7	8.0	26.3	-	-
19	5	20'-22'	20.4	22.2	57.4	27.6	29.8
19	6	25'-27'	56.4	18.7	24.9	-	-
19	7	30'-32'	28.4	11.2	60.4	25.9	34.5
19	8	35'-37'	19.2	17.5	63.3	31.0	32.3
19	0	45'-47'		N O	S A M P L E		
19	11	50'-52'	49.8	23.2	27.0	14.9	12.1
19	13	60'-62'	74.0	7.7	18.3	-	-
19	15	70'-72	41.6	25.5	32.9	16.3	16.6
19	17	80'-82'	29.7	38.6	31.7	-	-
19	18	85'-87'	50.0	12.3	37.7	20.7	17.0
19	19	90'-92'	35.6	10.4	54.0	26.8	27.2
19	20	95'-97'	53.8	8.2	38.0	-	-
20	3	10'-12'	36.2	28.3	35.5	15.4	20.1

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
20	4	15'-17'	83.1	8.8	8.1	-	-
20	5	20'-22'	54.2	23.5	22.3	-	-
20	7	30'-32'	3.7	29.1	67.2	24.8	42.4
20	8	35'-37'	62.9	22.9	14.2	-	-
20	11	50'-52'	81.1	7.0	11.9	-	-
20	13	60'-62'	29.0	10.7	60.3	-	-
20	15	70'-72'	71.1	12.1	16.8	-	-
20	17	80'-82'	41.9	19.7	38.4	-	-
20	19	90'-92'	41.9	19.7	38.4	21.4	17.0
20	20	95'-97'	33.7	29.7	36.6	20.7	15.9
21	3	10'-12'	32.9	7.9	59.2	-	-
21	4	15'-17'	0.0	0.5	99.5	31.6	67.9
21	5	20'-22	26.1	13.6	60.3	36.2	24.1
21	6	25'-27	48.9	3.9	47.2	11.3	35.9
21	7	30'-32'	49.2	22.1	28.7	-	-
21	9	40'-42'	71.3	17.5	11.2	-	-
21	11	50'-52'	30.4	17.8	51.8	-	-
21	13	60'-62'	0.0	8.9	91.1	24.2	66.9
21	15	70'-72'	47.7	16.5	35.8	10.0	25.8
21	17	80'-92'	0.0	10.0	90.0	21.4	68.6
21	18	85'-87'	N O	S A M P L E			
21	21 & 22	100'-102	0.0	0.6	99.4	34.0	65.4

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
22	3 & 5	10'-12'	36.0	27.8	36.2	20.7	15.5
22	7 & 8	30'-37'	35.9	22.2	41.9	20.3	21.6
22	11 & 13	50'-62'	2.9	40.2	56.9	32.4	24.5
22	15	70'-72'	2.3	33.8	63.9	49.2	14.7
22	17 & 18	85'-87'	0.0	3.2	96.8	-	-
22	21	100'-102'	33.3	22.3	44.4	-	-
22	22	105'-107'	0.0	34.8	65.2	-	-
22	26	125'-127'	24.9	23.7	51.4	-	-
22	28	135'-137'	6.8	41.2	52.0	17.6	34.4
22	31 & 32	150'-157'	39.3	39.3	21.4	-	-
22	35	170'-172'	0.0	11.4	88.6	-	-
22	38 & 39	185'-192'	38.5	38.6	22.9	-	-
23	3	10'-12'	30.3	10.9	58.8	31.9	26.9
23	5	20'-22	82.8	2.0	15.2	-	-
23	7	30'-32'	13.6	15.3	71.1	-	-
23	9	40'-42'	25.7	14.6	59.7	27.3	32.4
23	11	50'-52'	7.9	31.2	60.9	24.3	36.6
23	13	60'-62'	16.6	10.3	73.1	33.0	40.1
23	14	65'-67'	0.0	4.9	95.1	47.6	47.5
23	15	70'-72'	33.0	32.6	34.4	-	-
23	16	75'-77'	0.0	32.0	68.0	34.3	33.7
23	17	80'-82'	81.8	7.2	11.0	-	-

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
23	18	85'-87'	25.5	38.7	35.8	-	-
23	19 & 20	90'-97'	30.1	39.2	30.7	13.5	17.2
24	3	10'-12'	0.0	12.8	87.2	-	-
24	5	20'-22'	0.0	4.7	95.3	25.0	70.3
24	7	30'-32'	53.4	34.3	12.3	-	-
24	9	40'-42'	28.2	15.5	56.3	-	-
24	11	50'-52'	16.8	17.1	66.1	50.2	15.9
24	13	60'-62'	45.7	20.9	33.4	-	-
24	15 & 16	70'-72'	30.9	28.1	41.0	17.6	23.4
24	17	80'-82'	40.8	13.5	45.7	-	-
24	19	90'-92'	0.0	6.5	93.5	-	-
24	20	95'-97'	0.0	7.2	92.8	16.1	76.7
24	23 & 24	110'-112'	33.7	15.7	50.6	-	-
24	26	125'-127'	0.0	23.3	76.7	21.8	54.9
24	27	130'-132'		N O	S A M P L E		
25	3	10'-12'	79.6	6.6	13.8	-	-
25	5	20'-22'	70.8	0.7	28.5	-	-
25	7	30'-32'	33.1	16.8	50.1	35.7	14.4
25	8	35'-37'	43.4	5.1	51.5	12.3	39.2
25	10	45'-47'	10.6	30.3	59.1	25.3	33.8
25	12	55'-57'	82.5	4.3	13.2	-	-
25	14	65'-67	31.5	13.6	54.9	-	-

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
25	16	75'-77'	49.0	29.4	21.6	-	-
25	17	80'-82'	48.3	19.2	32.5	23.2	9.3
25	19	90'-92'	57.4	8.5	34.1	17.3	16.8
25	21	100'-100'	31.7	29.9	38.4	-	-
25	23	110'-112'	30.6	35.1	34.3	-	-
25	25	120'-122'	61.8	18.0	20.2	-	-
25	27	130'-132'	52.4	30.9	16.7	-	-
25	29	140'-142'	35.4	43.0	21.6	-	-
25	30	145'-147'	42.0	37.1	20.9	-	-
26	3	10'-12'	90.9	4.8	4.3	-	-
26	5	20'-22'	75.2	11.0	13.8	-	-
26	7	30'-32'	29.1	25.0	45.9	15.5	30.4
26	9	40'-42'	86.3	6.4	7.3	-	-
26	12	55'-57'	19.8	53.2	27.0	-	-
26	14	65'-67'	52.4	40.6	7.0	-	-
26	16	75'-77'	53.0	15.4	31.6	10.0	21.6
26	18	85'-87'	24.7	21.3	54.0	14.5	39.5
26	20	95'-97'	23.4	35.3	41.3	-	-
26	22 & 24	105'-117'	89.4	3.3	7.3	-	-
26	25 & 26	125'-127'	45.9	28.1	26.0	8.3	17.7
26	28 & 29	135'-137'	4.7	26.0	69.3	27.3	47.2
26	32	155'-157'	64.6	22.8	12.6	-	-

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
26	33	160'-162'	0.9	21.2	77.9	-	-
26	34	165'-167'	29.8	17.0	53.2	-	-
26	35	170'-172'	37.8	33.9	28.3	-	-
26	36	175'-177'	0.6	37.1	62.3	37.1	25.2
27	3	10'-12'	0.0	0.3	99.7	49.7	50.0
27	5	20'-22'	42.7	2.5	54.8	-	-
27	7	30'-32'	86.8	3.3	9.9	-	-
27	9	40'-42'	23.5	7.2	69.3	43.1	26.2
27	11	50'-52'	31.4	13.5	55.1	25.3	29.8
27	13	60'-62'	28.1	19.4	52.5	18.5	34.0
27	15 & 16	70'-72'	80.9	9.6	9.5	-	-
27	17	80'-82'	11.9	13.4	74.7	31.5	43.2
27	19	90'-92'	63.5	8.4	28.1	16.5	11.6
27	20 & 21	95'-100'	0.0	1.4	98.6	16.4	82.2
27	22	105'-107'	0.0	13.0	87.0	-	-
27	23	110'-112'	81.3	3.4	15.3	-	-
27	25	120'-122'	0.0	26.1	73.9	-	-
27	26	125'-127'	0.0	4.9	95.1	-	-
27	27	130'-132'	0.0	6.3	93.7	-	-
27	29	140'-142'		N O	S A M P L E		
28	3	10'-12'	25.2	15.1	59.7	27.6	32.1
28	5	20'-22'	0.0	1.4	98.6	22.6	76.0

PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
28	7	30'-32'	80.8	7.6	11.6		
28	9	40'-42'	16.4	25.3	58.3	17.6	40.7
28	11	50'-52'	18.1	38.1	43.8	13.4	30.4
28	13	60'-62'	84.9	4.7	10.4	-	-
28	15	75'-77'		N O	S A M P L E		
28	19	90'-92'	51.9	27.7	20.4	-	-
29	3	10'-12'	82.8	6.7	10.5	-	-
29	4	15'-17'		N O	S A M P L E		
29	5 & 6	20'-27'	84.3	6.3	9.4	-	-
29	7	30'-32'	30.2	37.0	32.8	-	-
29	9	40'-42'	63.7	21.8	14.5	-	-
29	11	52'-52'	46.2	24.3	29.5	15.2	14.3
29	12	55'-57'	61.9	21.9	16.2	-	-
29	14	65'-67'	0.0	1.4	98.6	25.7	72.9
29	16	75'-77'	25.0	26.6	48.4	-	-
29	18	85'-87'	10.8	41.7	47.5	-	-
29	20	95'-97'	10.0	28.1	61.9	38.3	23.6
29	22	105'-107'	36.3	32.7	31.0	-	-
29	24	115'-117'	78.7	7.4	13.9	-	-
29	25	120'-122'	0.0	8.0	92.0	30.8	61.2
30	3	10'-12'	0.0	3.9	96.1	47.8	48.3
30	5	20'-22'	30.2	7.2	62.6	33.6	29.0

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
30	7	30'-32'	27.9	22.6	49.5	24.4	25.1
30	9	40'-42'	21.3	8.7	70.0	-	-
30	11	50'-52'	0.0	7.5	92.5	0.9	91.6
30	13	60'-62'	30.0	22.1	47.9	-	-
30	16	75'-77'	62.2	15.7	22.1	-	-
30	17	80'-82'	0.0	2.1	97.9	29.6	68.3
30	18	85'-87'	0.0	10.5	89.5	-	-
30	19	90'-92'	44.3	8.8	46.9	23.8	23.1
31	3	10'-12'	37.9	29.4	32.7	-	-
31	5	20'-22'	0.0	20.3	79.7	56.2	23.5
31	7	30'-32'	15.6	5.5	78.9	63.0	15.9
31	8	35'-37'	64.9	14.2	20.9	-	-
31	10	45'-47'	49.9	15.8	34.3	11.2	23.1
31	12	55'-57'	17.6	15.1	67.3	-	-
31	13	60'-62'	0.0	23.2	76.8	-	-
31	14	65'-67'	30.7	16.2	53.1	-	-
31	16	75'-77'	19.2	24.4	56.4	-	-
31	18	85'-87'		21.7	78.3	-	-
31	20	95'-97'	32.1	18.3	49.6	-	-
31	21	100'-100'	0.0	1.7	98.3	-	-
31	22	105'-107'	0.0	6.3	93.7	-	-
31	23	110'-112'	72.2	7.2	20.6	-	-

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PERCENT PARTICLE SIZE DETERMINATION BY SIEVE OR HYDROMETER ANALYSIS

CORCO FACILITY, PENUELAS, PUERTO RICO

BORING NO.	SAMPLE NO.	DEPTH	% GRAVEL	% SAND	% FINES	% SILT	% CLAY
32	3	10'-12'	3.2	22.2	74.6	45.3	29.3
32	4	15'-17'	88.8	4.9	6.3	-	-
32	6	25'-27'	26.5	18.8	54.7	26.3	28.4
32	7	30'-32'	76.7	5.4	17.9	-	-
32	8	35'-37'	27.0	7.6	65.4	45.3	20.1
32	10	45'-47'	0.0	6.2	93.8	-	-
32	11	50'-52'	28.9	11.4	59.7	-	-
32	13	60'-62'	53.7	19.4	26.9	-	-
32	15	70'-72'	73.0	4.3	22.7	-	-
32	18	85'-87'	62.3	14.0	23.7	-	-
32	20	95'-97'	59.1	19.0	21.9	-	-
32	22	105'-107'	45.3	16.7	38.0	21.6	16.4
32	25	120'-122'	48.1	22.1	29.8	-	-
32	27	130'-132'	63.5	12.3	24.2	15.6	8.6
32	29	140'-142'	31.2	23.1	45.7	25.8	19.9
32	31	150'-152'	59.2	15.3	25.5	-	-
32	32	155'-157'	68.5	8.9	22.6	-	-
32	33	160'-162'	26.1	31.7	42.2	27.4	14.8
32	35	170'-172'	47.0	22.6	30.4	16.7	13.7

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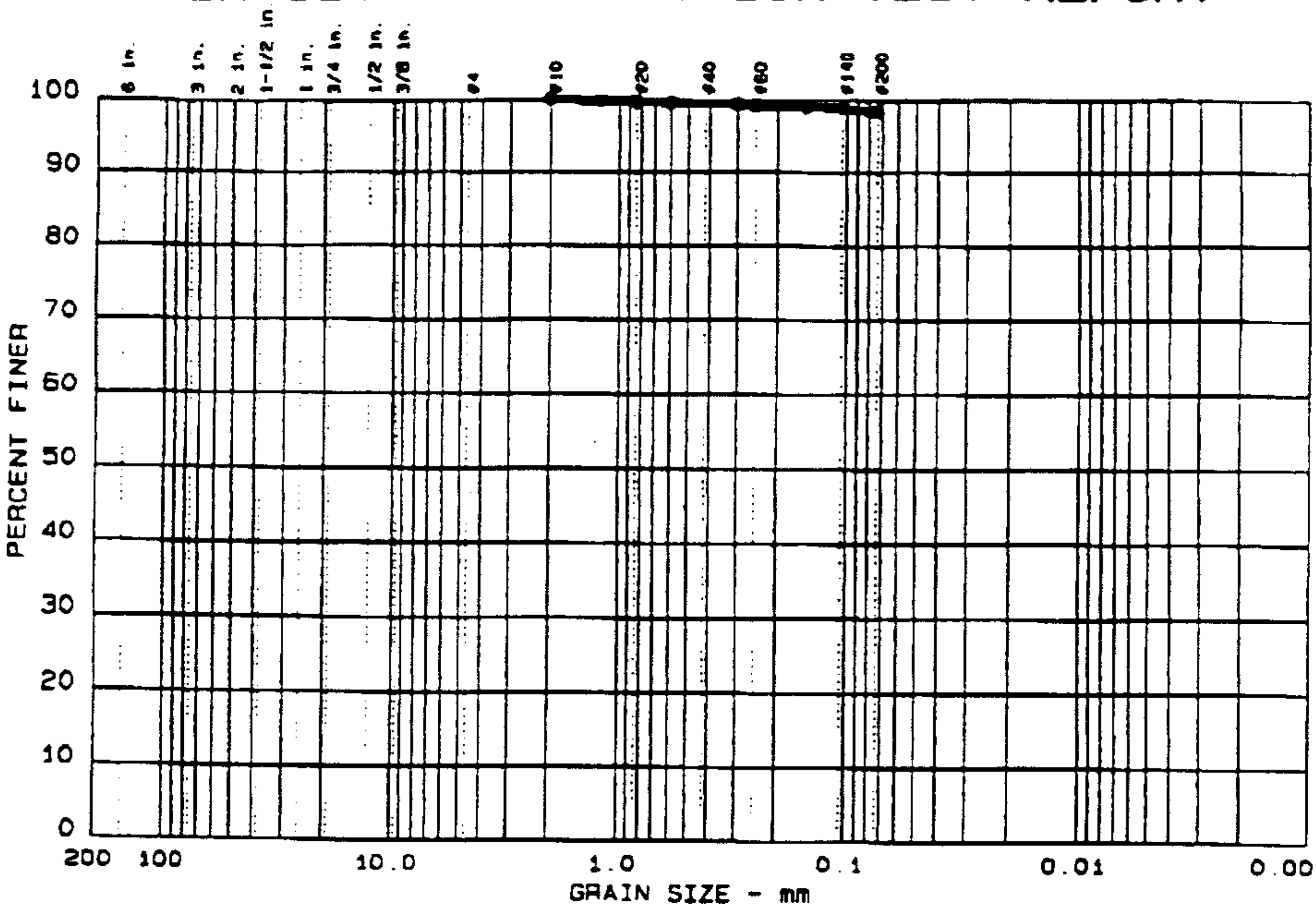
GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	0.0	1.7	98.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	67.4	39.1								

MATERIAL DESCRIPTION	USCS	AASHTO
● DARK GRAY, FINES TRACE SAND	CH	A-7-6(45.2)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-4, 16 @ 18 FEET OF DEPTH

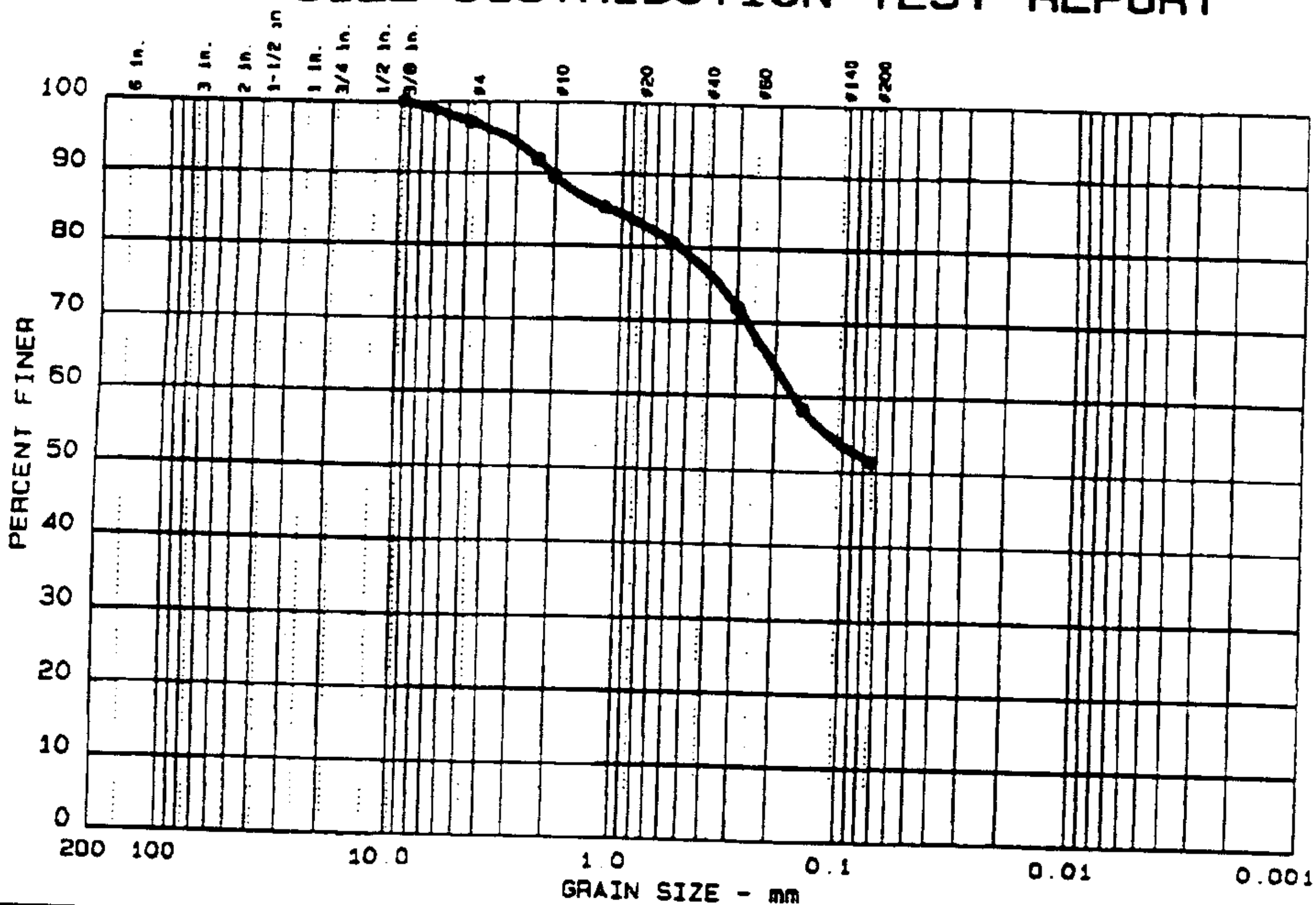
Date: SEPTEMBER 9, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
SOIL TECH

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	8	0.0	2.8	45.8	51.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	37.4	14.1	1.06	0.16						

MATERIAL DESCRIPTION	USCS	AASHTO
● DARK GRAY, FINES AND SAND MIXTURE, TRACE GRAVEL	CL	A-6 (4.4)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-4, 20 @ 22 FEET OF DEPTH

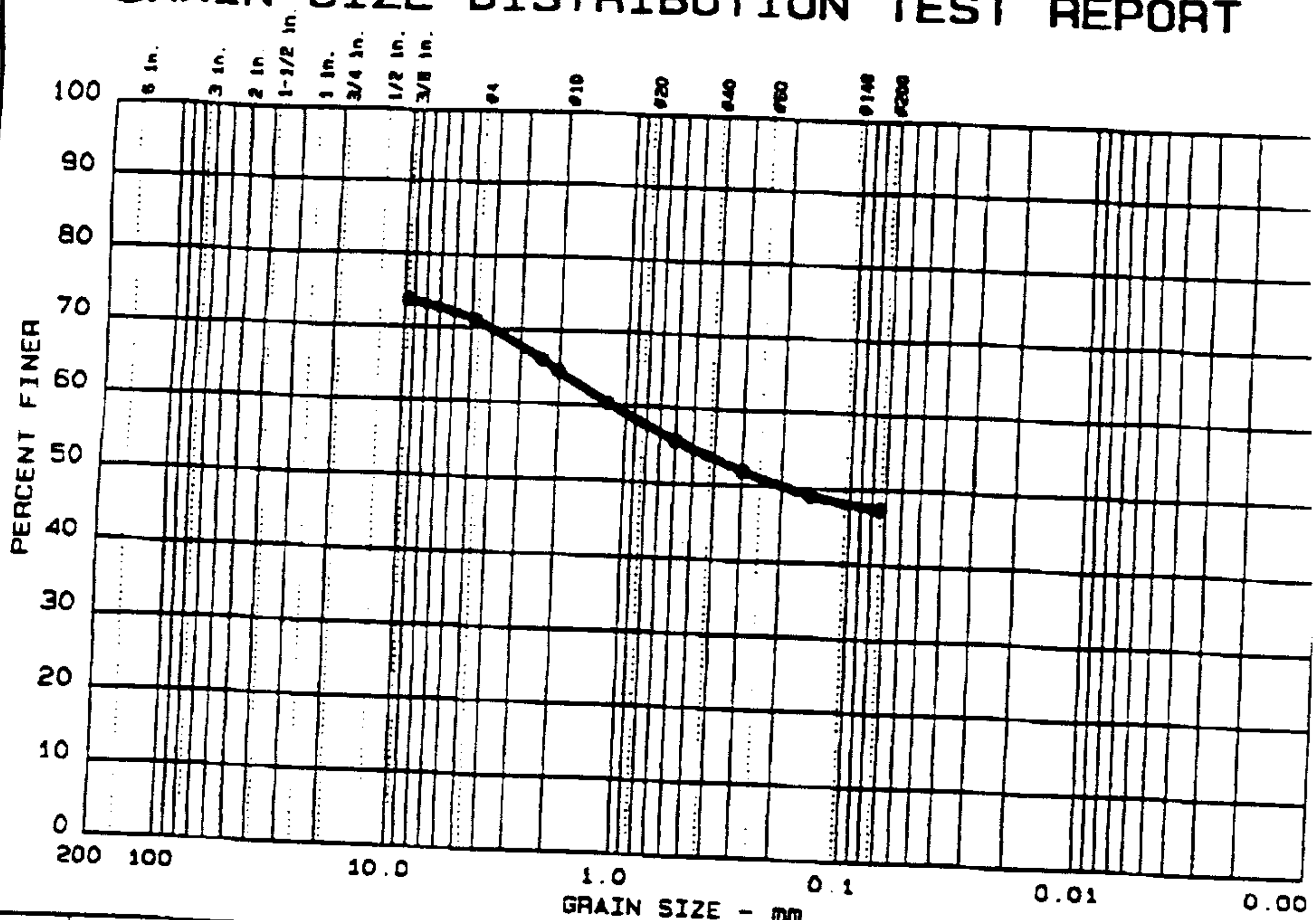
Date: SEPTEMBER 9, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
SOIL TECH

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	1	0.0	29.0	23.7	47.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	41.0	24.7	9.52	1.13	0.20					

MATERIAL DESCRIPTION	USCS	AASHTO
● VERY PALE ORANGE, FINES, SOME GRAVEL SOME SAND	GC	A-7-6(7.3)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-9, 10 @ 12 FEET OF DEPTH

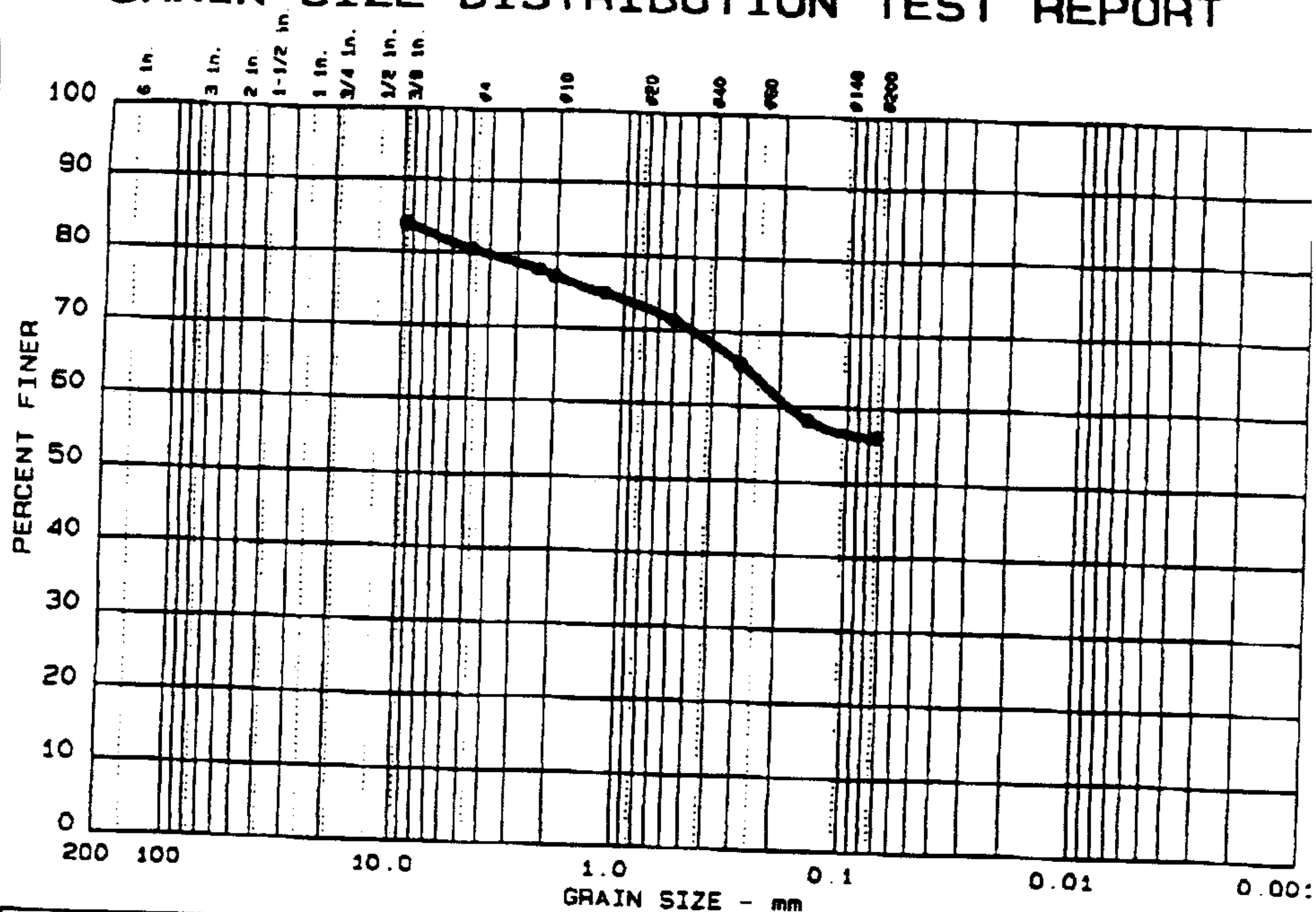
Date: SEPTEMBER 9, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
SOIL TECH

Figure No. 16

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	19.6	24.4	56.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	33.1	19.0	9.52	0.18						

MATERIAL DESCRIPTION	USCS	AASHTO
● VERY PALE YELLOW & YELLOW, FINES, S. SAND, S GRA	CL	A-6(7.2)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-9, 20 @ 22 FEET OF DEPTH

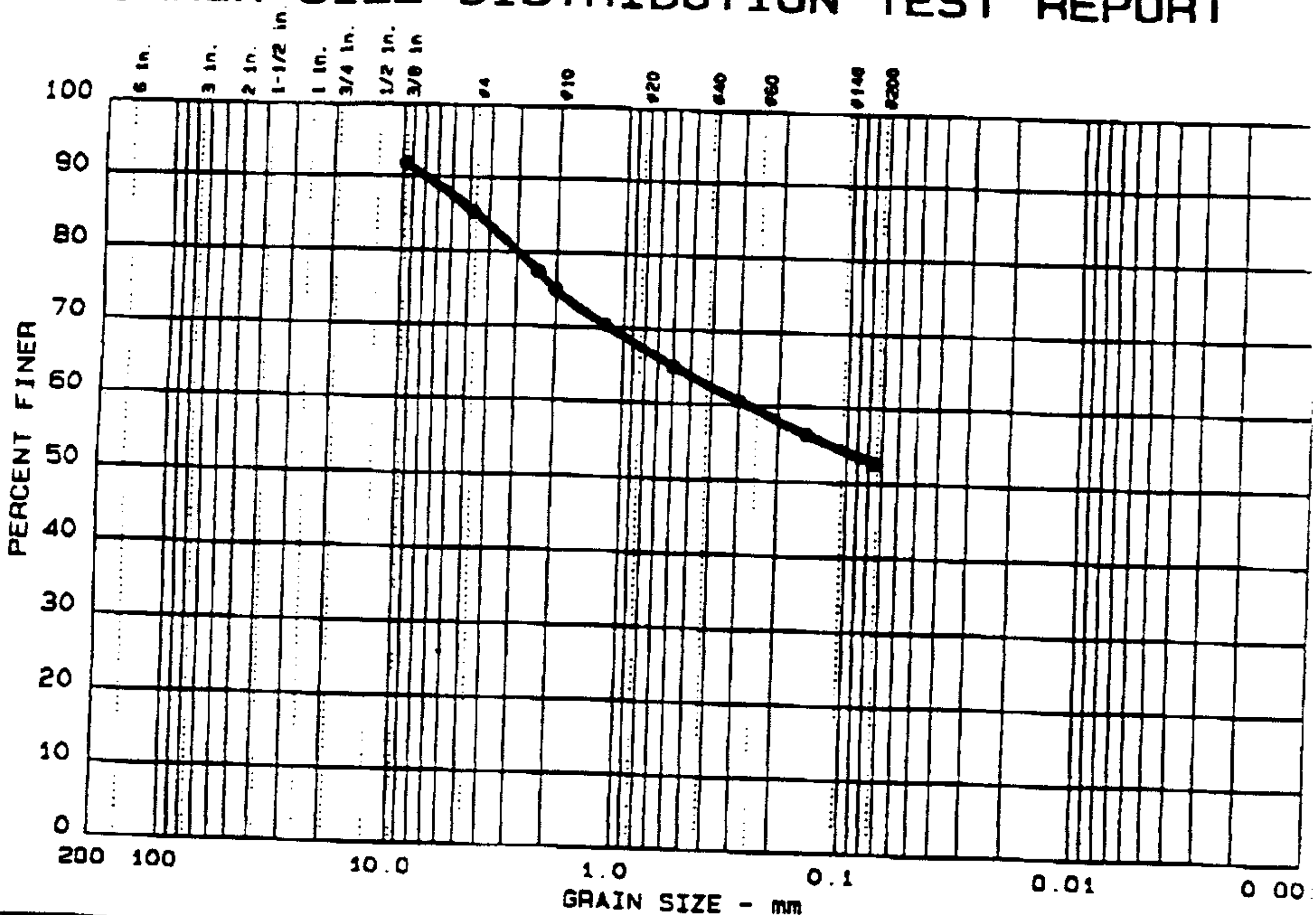
Date: SEPTEMBER 9, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
SOIL TECH

Figure No. 17

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	14.7	32.7	52.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	32.8	18.3	4.57	0.27						

MATERIAL DESCRIPTION	USCS	AASHTO
● VERY PALE ORANGE & YELLOW, FINES, S. SAND, S GRAV	CL	A-6(8.0)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-9, 30 @ 32 FEET OF DEPTH

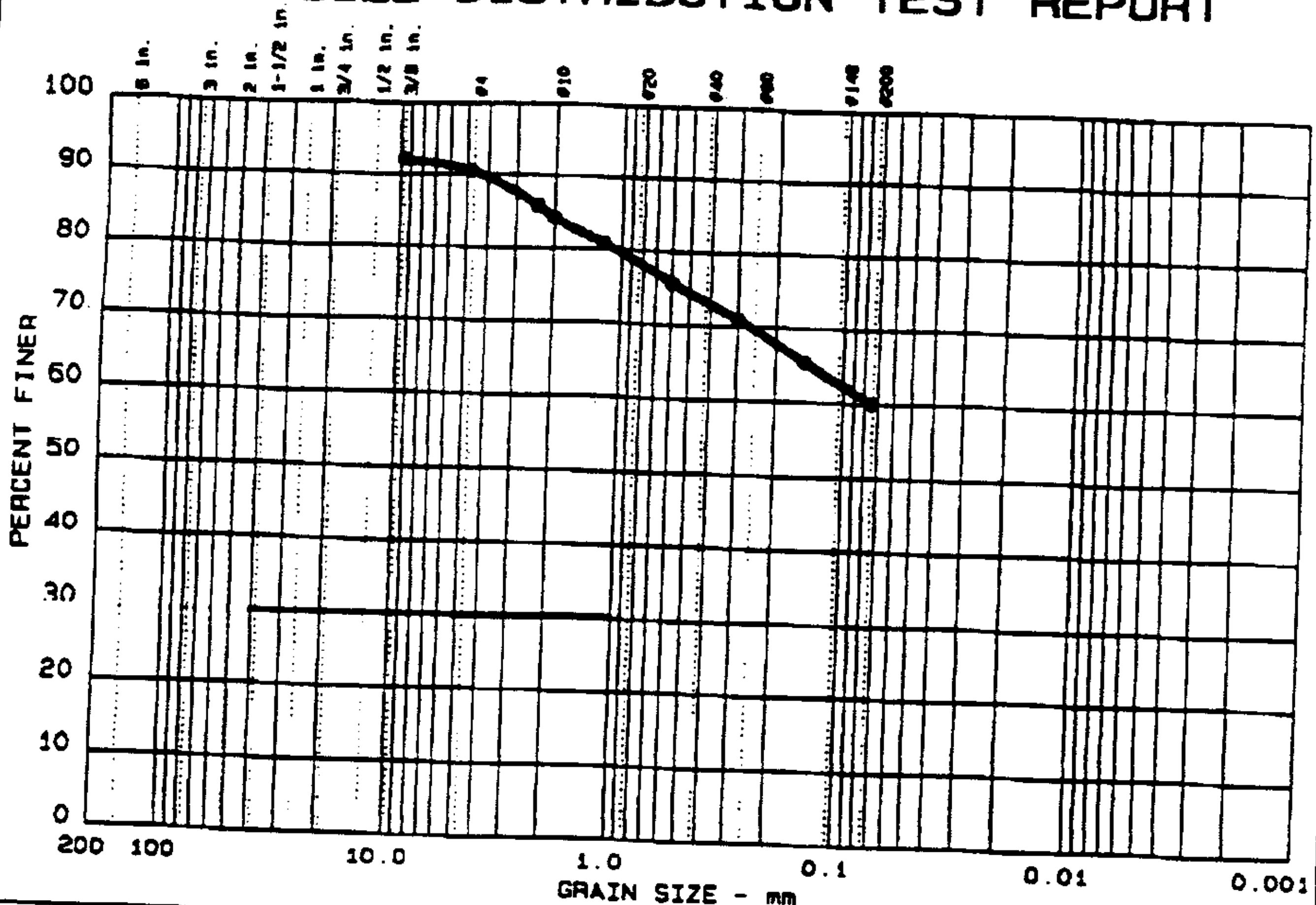
Date: SEPTEMBER 12, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
SOIL TECH

Figure No. 18

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	9.5	30.6	59.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	34.7	17.2	2.16	0.07						

MATERIAL DESCRIPTION	USCS	AASHTO
● YELLOWISH BROWN & YELLOW, FINES, S SAND, TR GRAV	CL	A-6(7.5)

Project No.: 941979

Project: COMMONWEALTH OIL REFINING COMPANY INC.

● Location: PD-9, 40 @ 42 FEET OF DEPTH

Date: SEPTEMBER 12, 1994

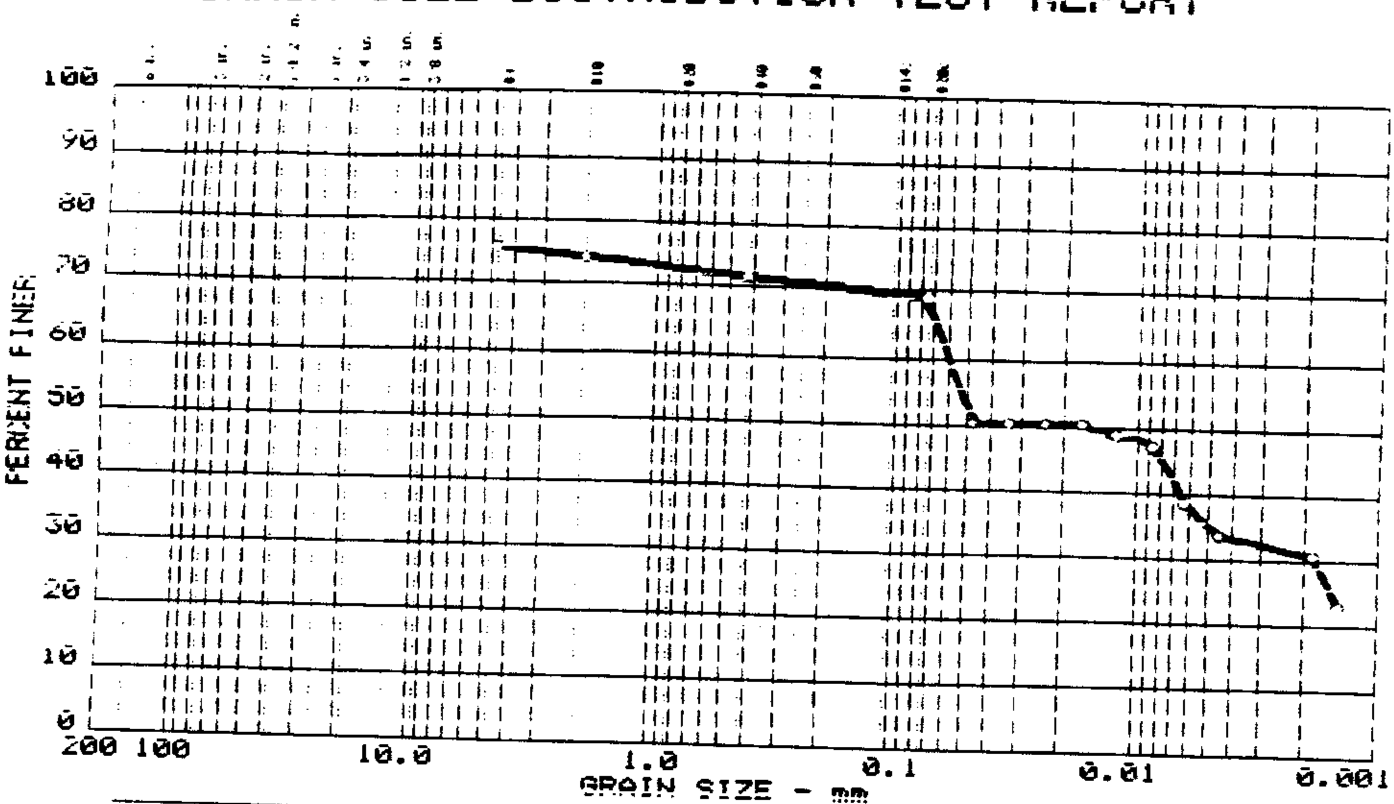
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

SOIL TECH

Figure No. 19

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 10	0.0	24.3	6.5	34.0	35.2

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	32.77	16.12	4.750		0.016	0.002				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT/CLAY LIMESTONE GRAVEL, TRACE SAND	CL	A-6(9)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-10 SAMPLE NO. 5

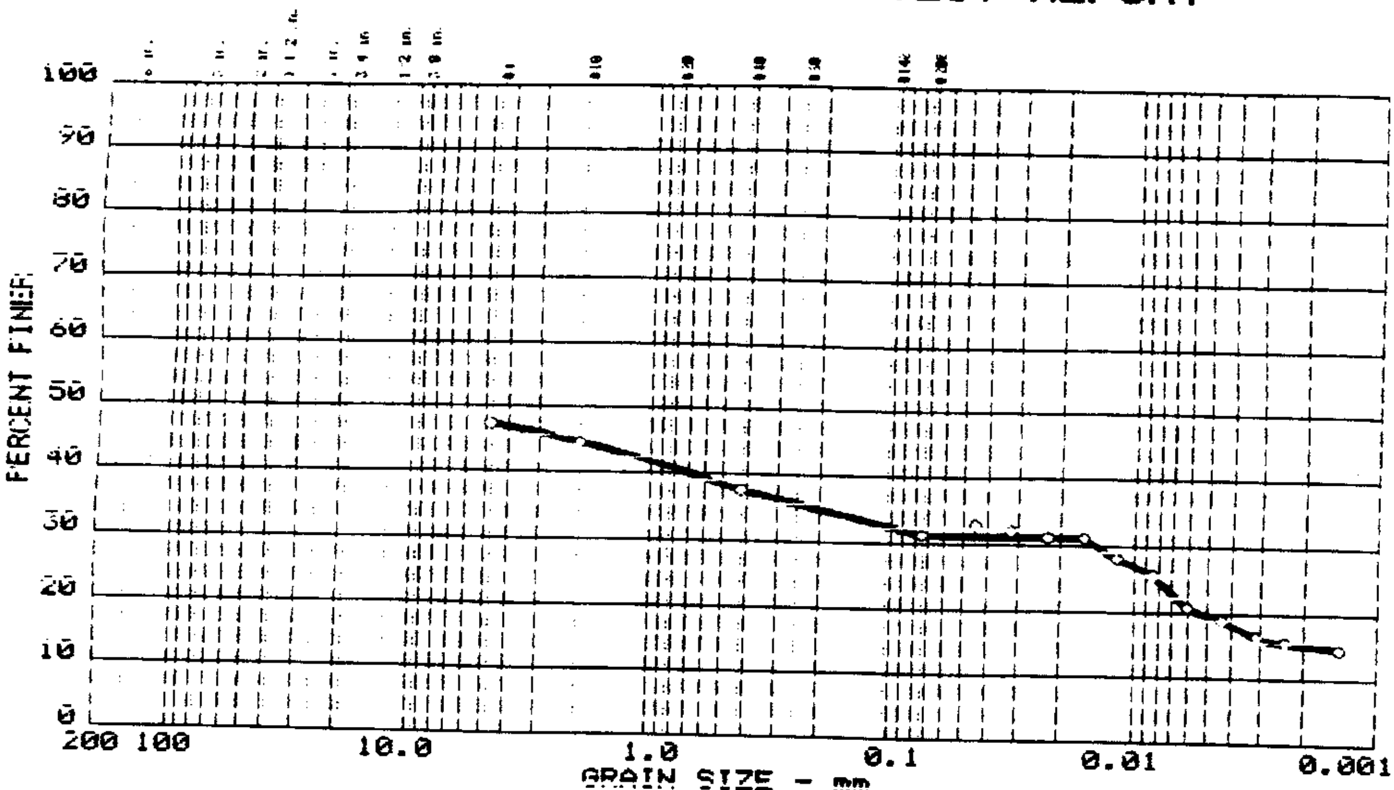
Date: SEPTEMBER 30, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
9	0.0	52.7	15.9	11.8	19.6

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
		4.75	4.75	4.75	0.014	0.0017			

MATERIAL DESCRIPTION	USCS	AASHTO
LIMESTONE GRAVEL, SOME SAND, SOME SILT/CLAY		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHSE I
Location: BORING PD-10 SAMPLE NO. 6

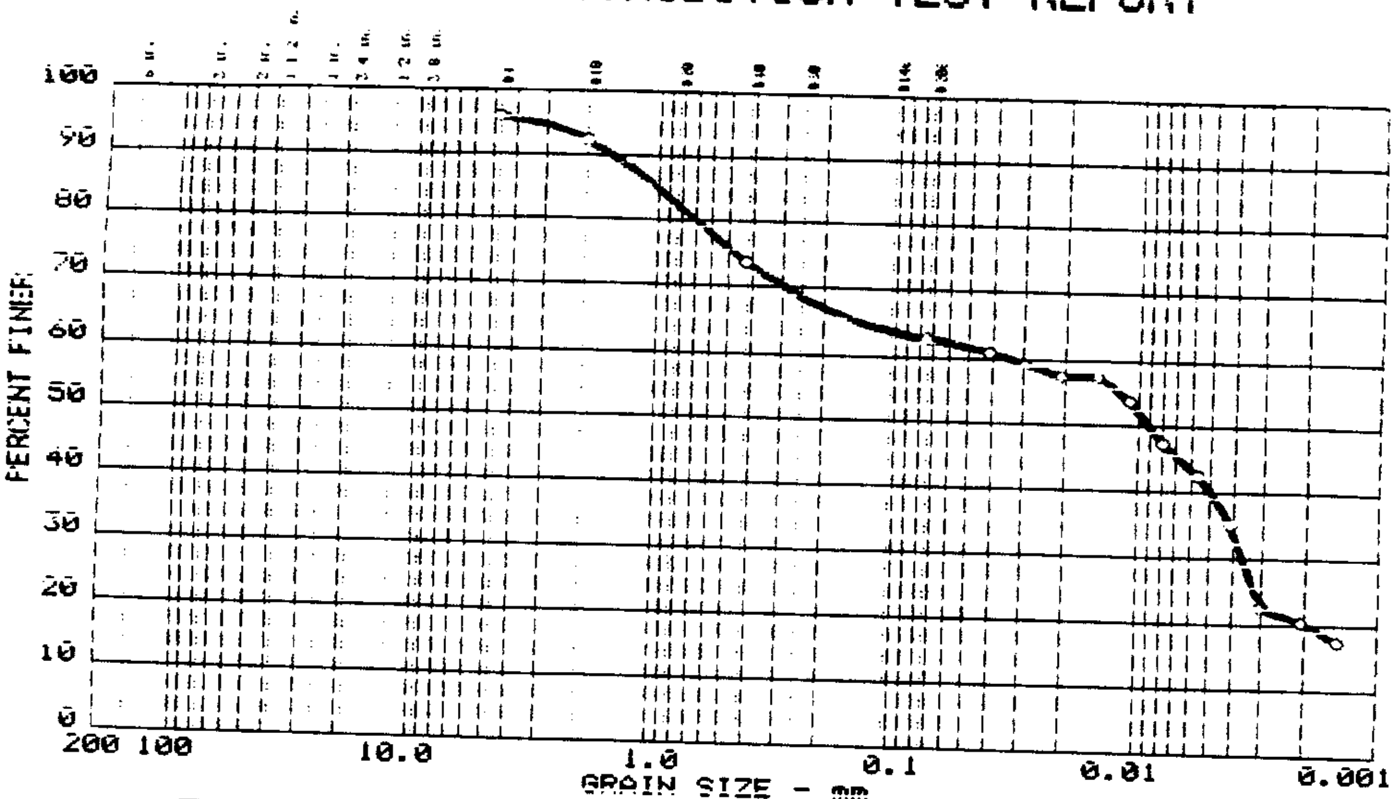
Date: SEPTEMBER 30, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 8	0.0	4.2	32.9	22.9	40.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	26.8	9.7	1.000		0.009	0.004				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY AND SAND, TRACE LIMESTONE GRAVEL.	CL	A-4(4)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-10 SAMPLE NO. 12

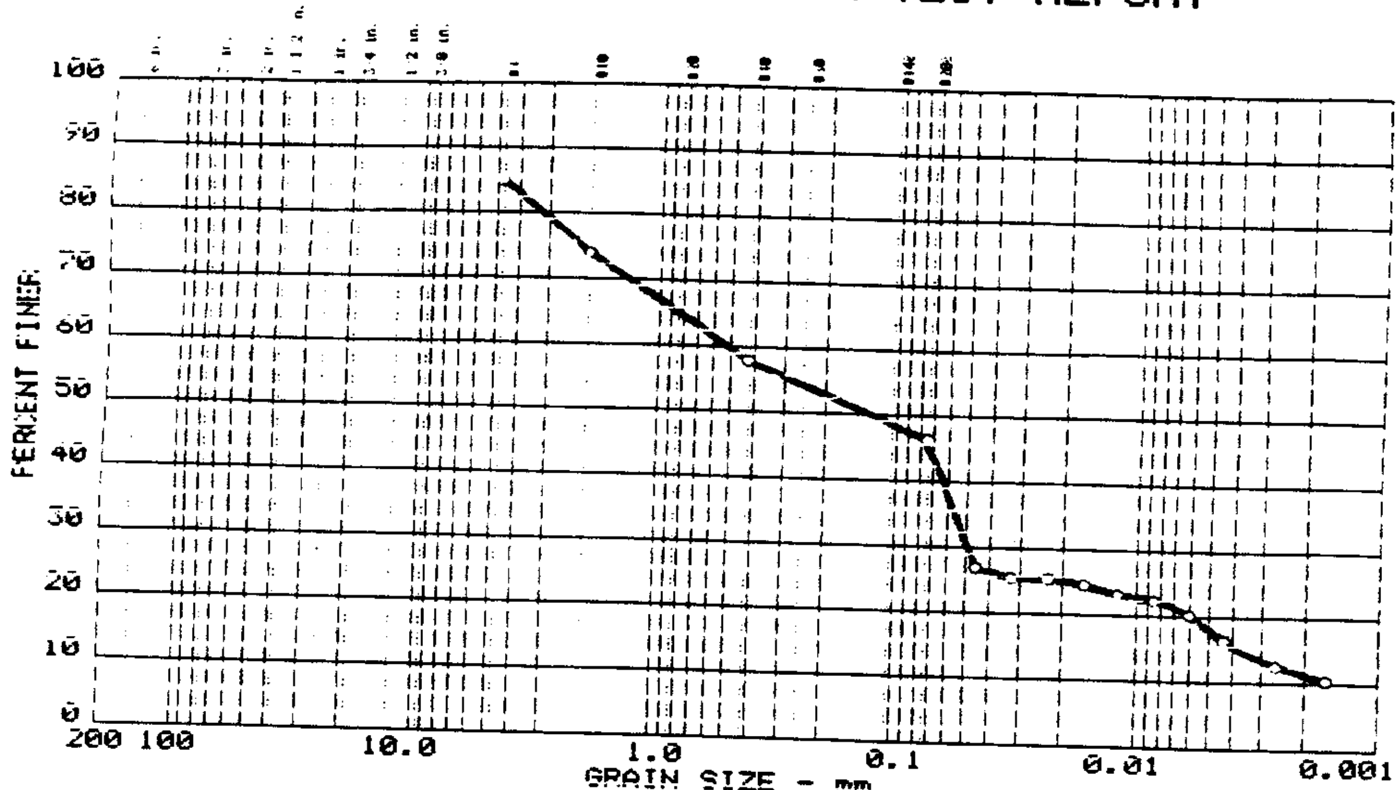
Date: SEPTEMBER 13, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 7	0.0	14.9	38.7	28.3	18.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	23.1	5.9	4.68	0.52	0.13	0.049	0.0037			

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SILTY SAND, SOME LIMESTONE GRAVEL.	SC-SM	A-4

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-10 SAMPLE NO. 11

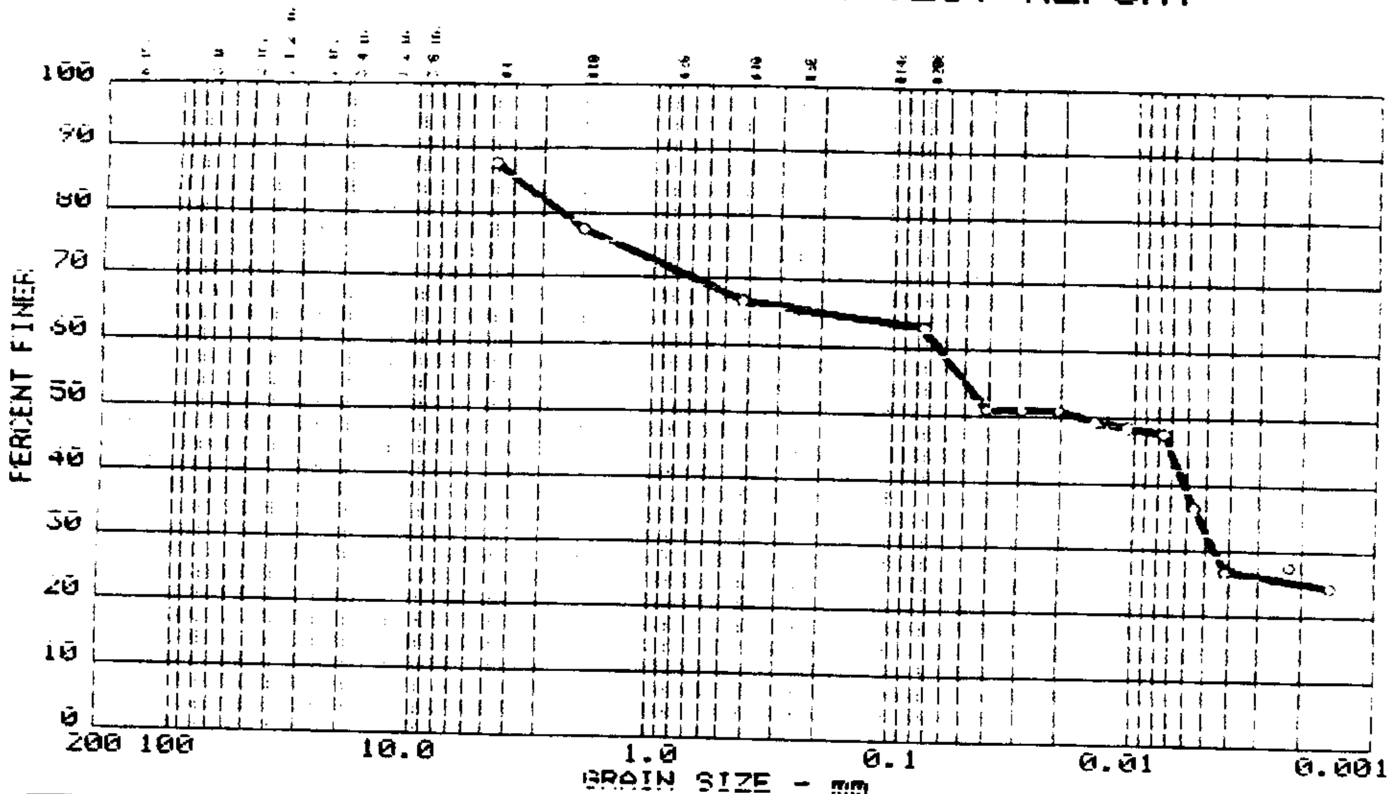
Date: SEPTEMBER 13, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	0.0	12.3	24.5	30.5	32.7

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	39.2	18.3	3.715		0.016	0.005				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT/CLAY, SOME LIMESTONE GRAVEL, SOME SAND	CL	A-6(9)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-11 SAMPLE NO. 7 & 8

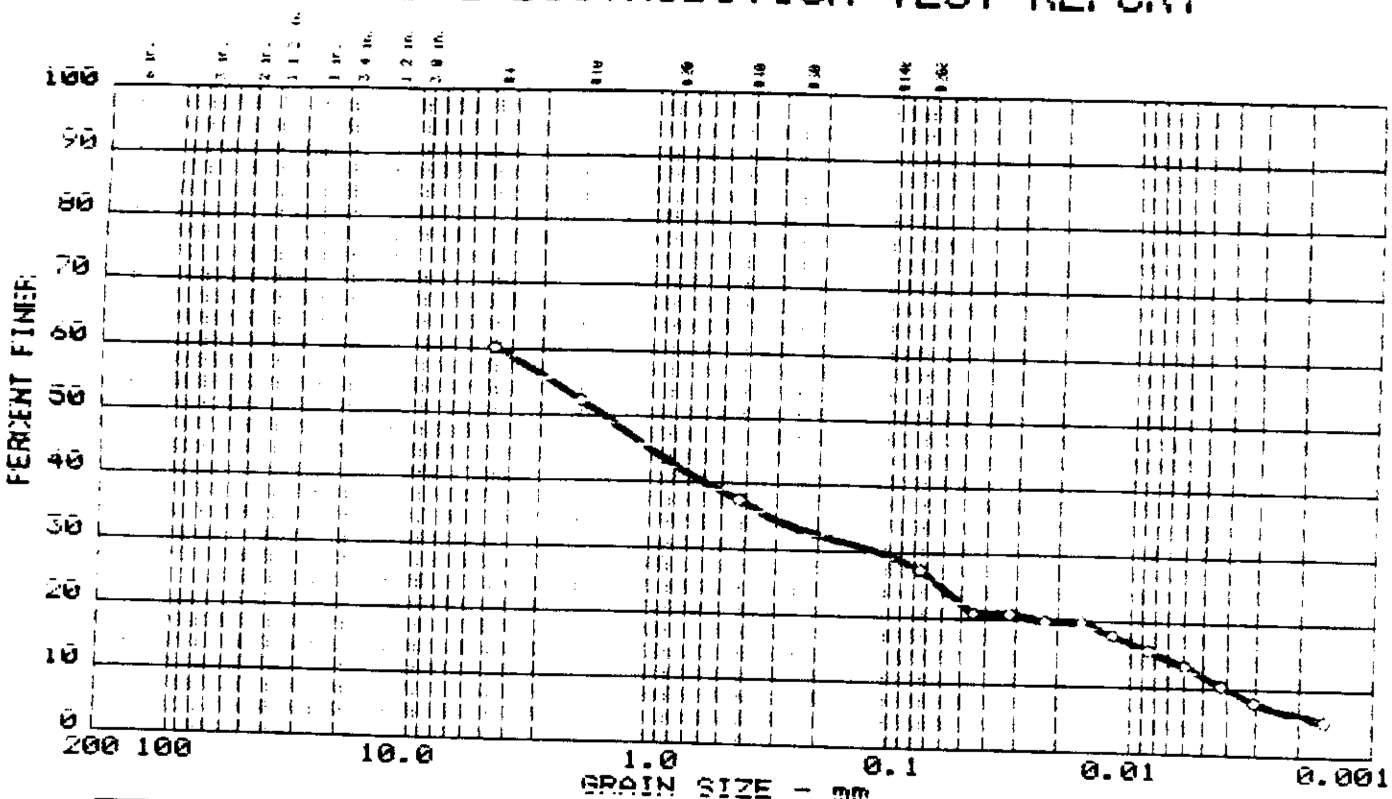
Date: SEPTEMBER 13, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 2	0.0	39.7	32.9	15.5	11.9

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	16.3	2.0	4.75	4.59	1.59	0.106	0.0075	0.0040	0.62	1161.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ FINE TO MEDIUM SAND AND LIMESTONE GRAVEL	SM	A-2-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD 12 SAMPLE NO. 5

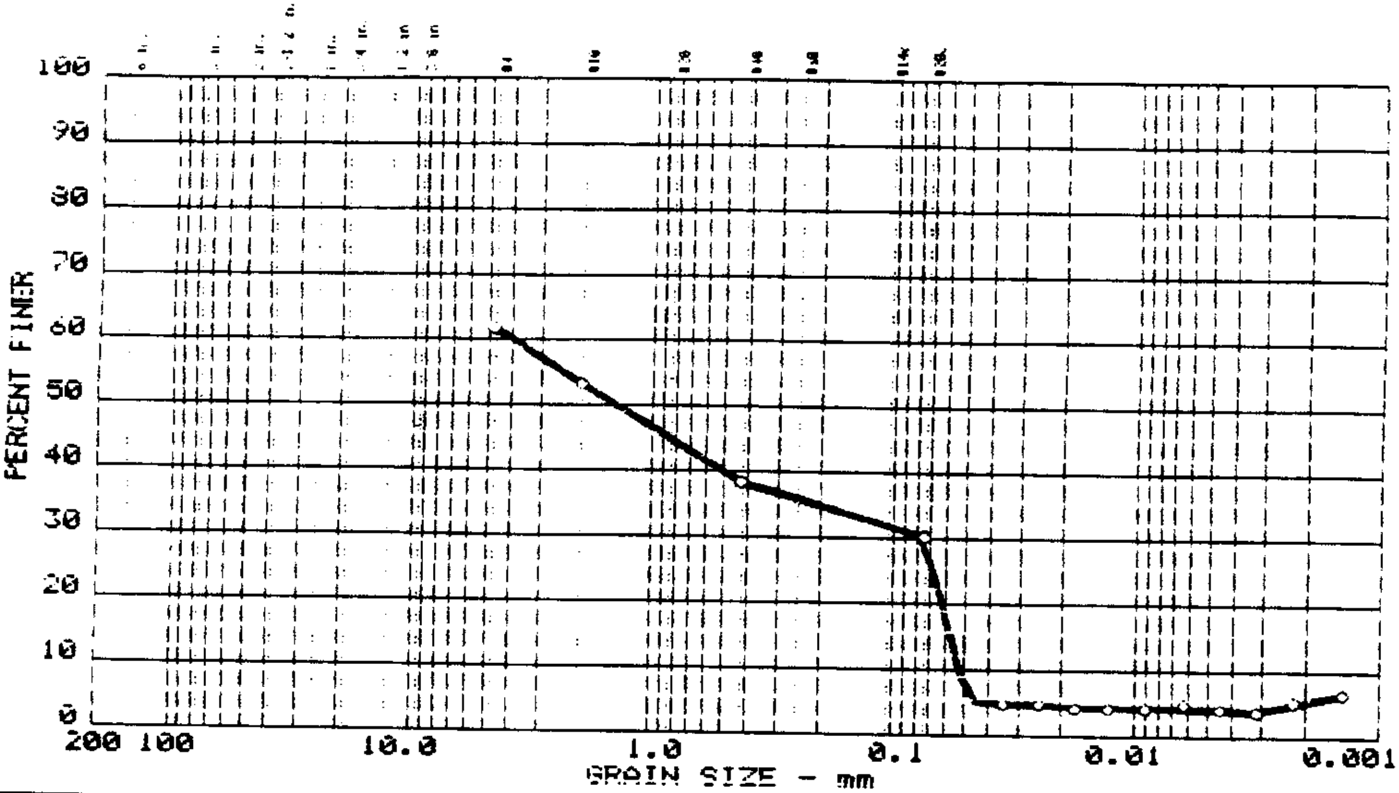
Date: SEPTEMBER 13, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 3	0.0	38.3	31.4	26.0	4.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			4.75	3.95	1.42	0.074	0.0576	0.0529	0.03	74.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ FINE TO MEDIUM SAND AND GRAVEL, AND SILT.	GM	A-2-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-12 SAMPLE NO. 13

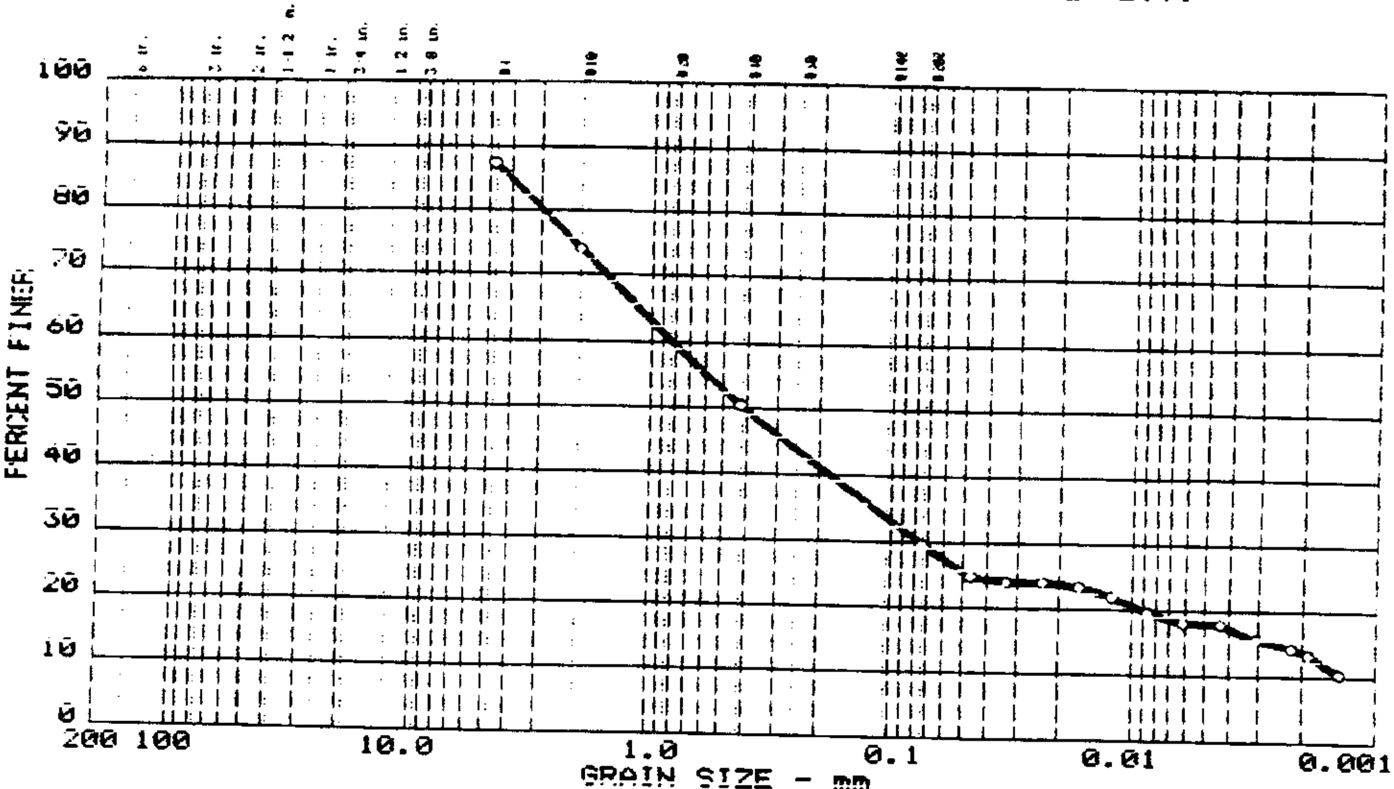
Date: SEPTEMBER 13 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 4	0.0	12.4	57.9	11.6	18.1

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○ 10.1	4	3.90	0.81	0.41	0.077	0.0024			

MATERIAL DESCRIPTION	USCS	AASHTO
○ FINE CLAYEY SILTY SAND, SOME LIMESTONE GRAVEL.	SC-SM	A-2-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-14 SAMPLE NO. 6

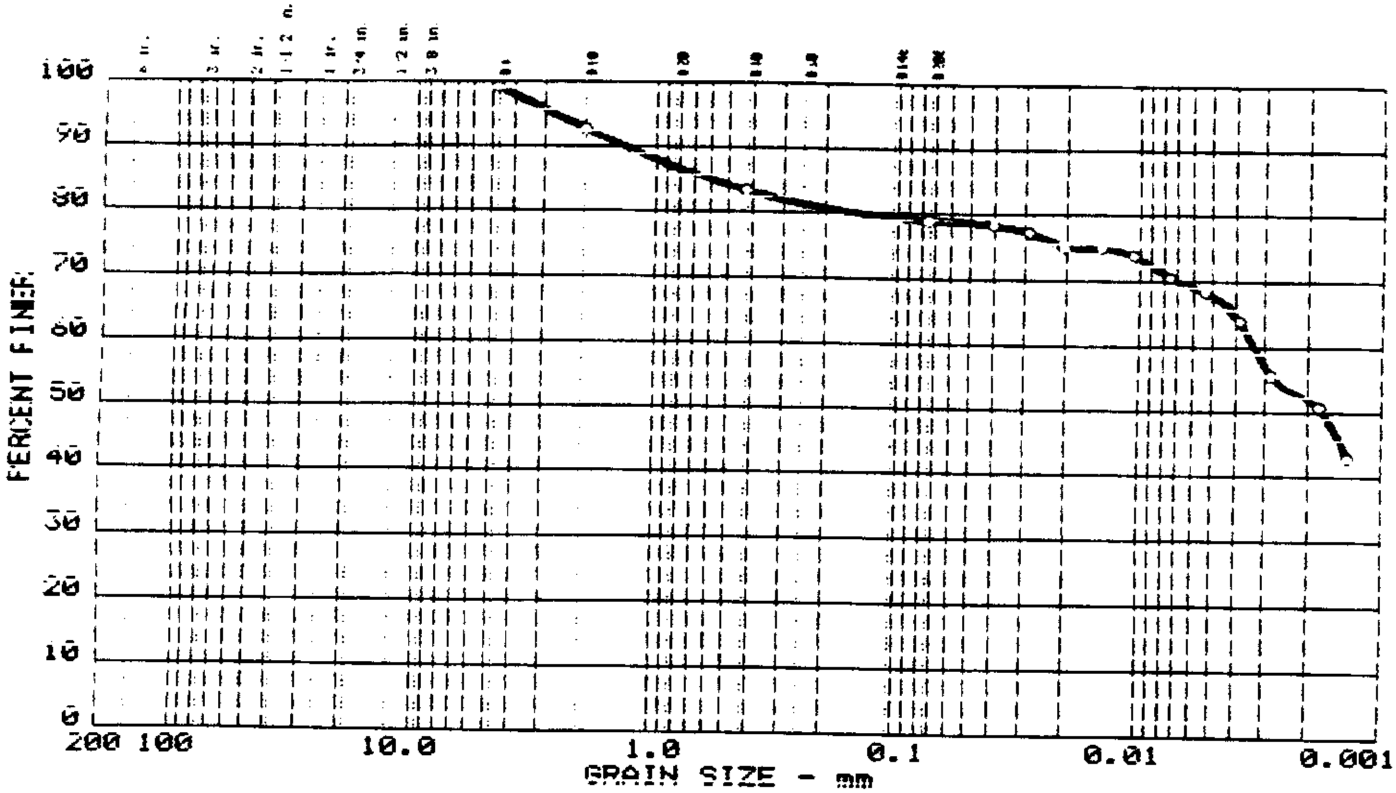
Date: SEPTEMBER 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	0.0	0.7	20.3	11.1	67.9

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	34.7	21.4	0.509		0.002					

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY, SOME SILTY, SOME SAND, LITTLE GRAVEL	CL	A-6(16)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-14 SAMPLE NO. 7

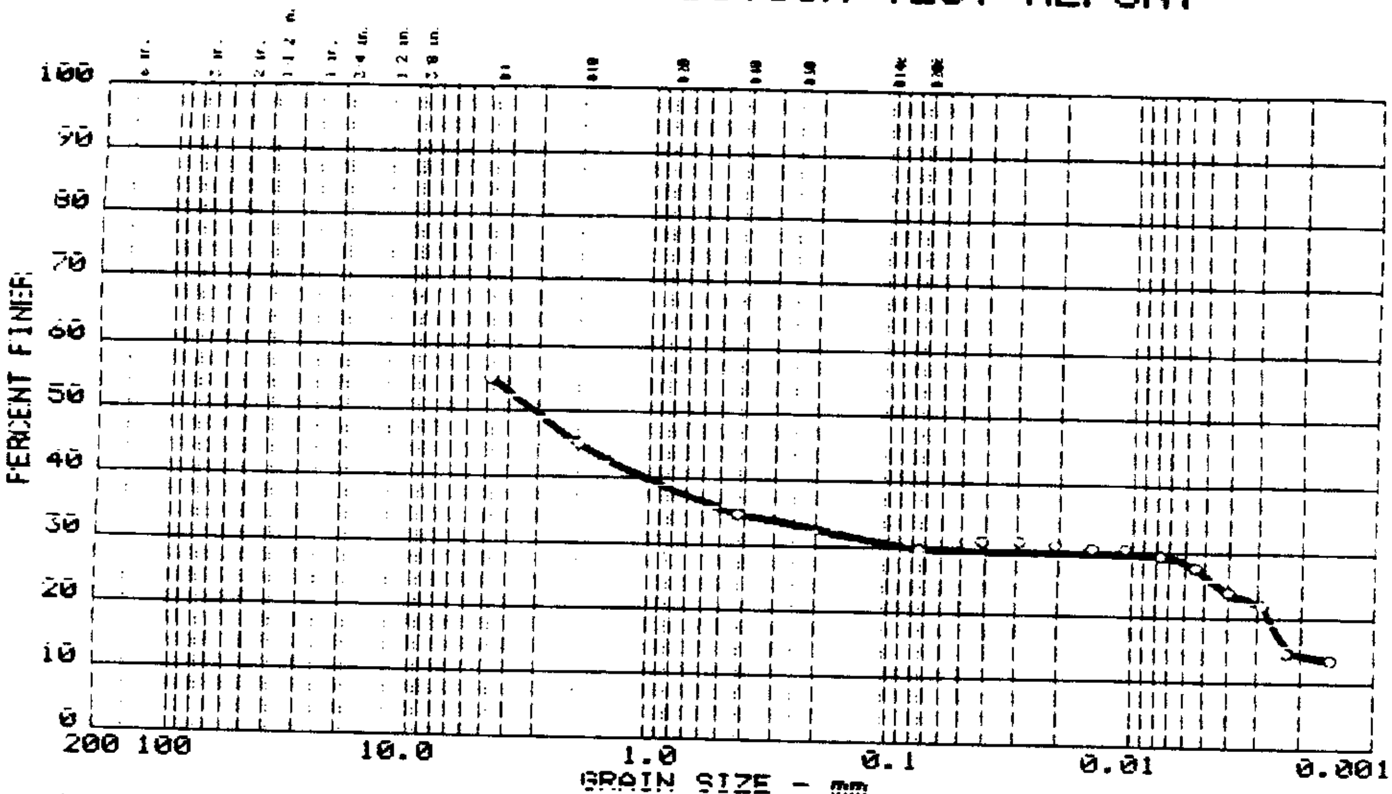
Date: SEPTEMBER 14, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 6	0.0	45.0	25.2	3.3	26.5

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○ 24.4	10.0	4.75	4.75	3.10	0.075	0.0023			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY CLAYEY LIMESTONE GRAVEL, TRACE SILT	GC	A-2-6(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-15 SAMPLE NO. 10 & 11

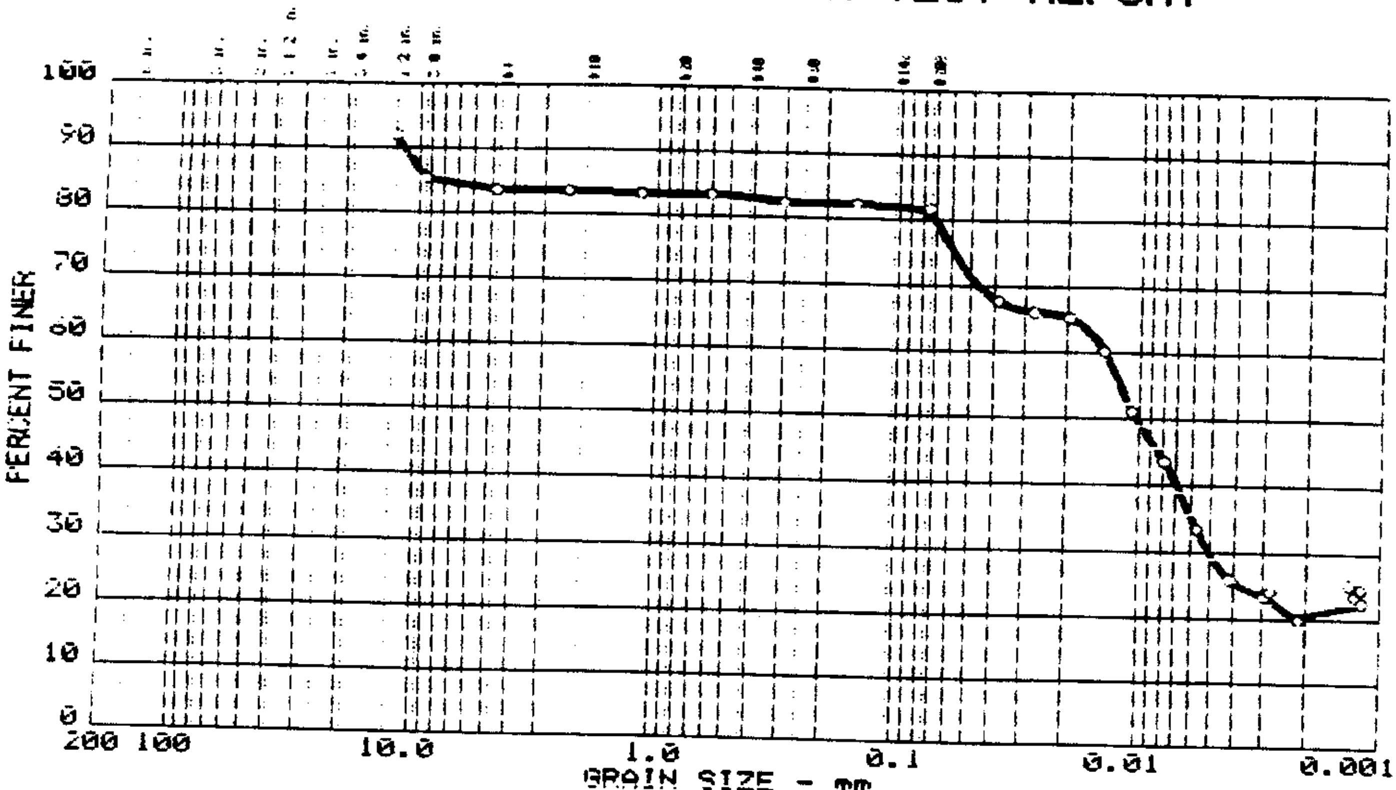
Date: SEPTEMBER 15, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 15	0.0	16.4	1.9	52.1	29.6

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	24.9	9.2	0.128		0.010	0.005				

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SILT, SOME SAND, TRACE LIMESTONE GRAVEL.	CL-ML	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-16 SAMPLE NO. 3

Date: SEPTEMBER 16, 1994

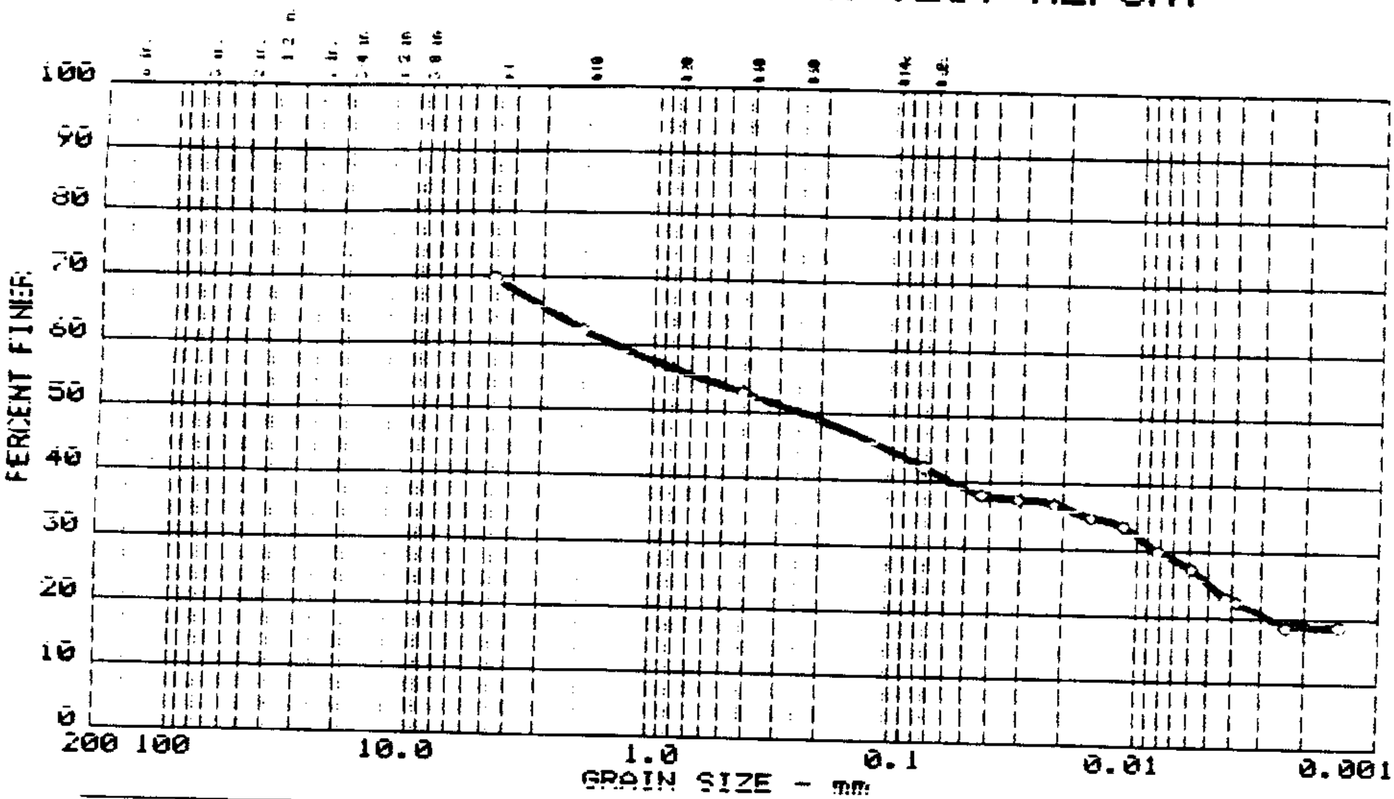
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	0.0	30.2	27.7	16.9	25.2

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	24.5	8	4.75	1.47	0.24	0.008				

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SANDY LIMESTONE GRAVEL	GC	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-16 SAMPLE NO. 4

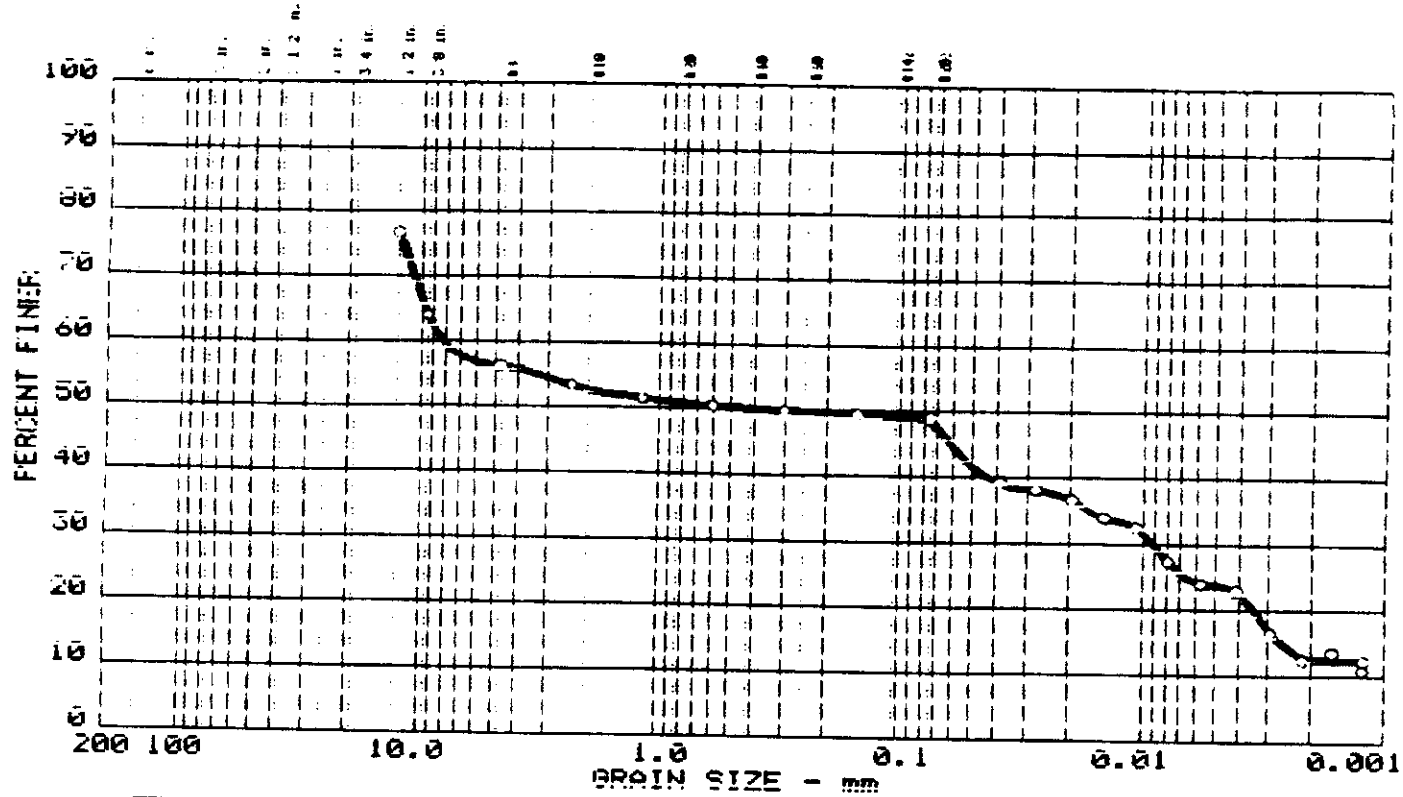
Date: SEPTEMBER 16, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 12	0.0	43.7	7.3	25.2	23.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	33.5	15.4	12.70	8.11	0.37	0.009	0.0026			

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SILTY LIMESTONE GRAVEL, TRACE SAND.	GC	A-6(4)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-16 SAMPLE NO. 7

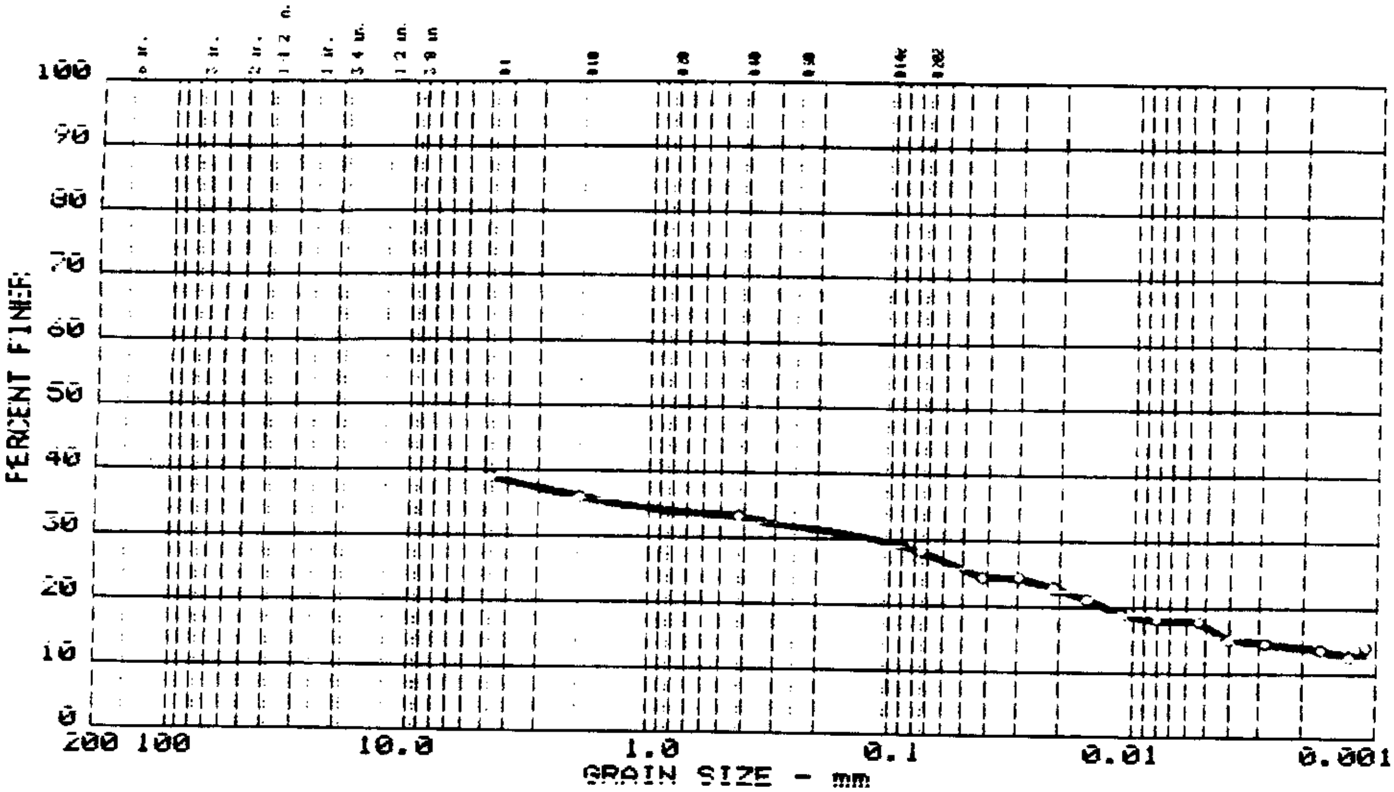
Date: SEPTEMBER 17, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 11	0.0	61.0	10.7	10.9	17.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	51	30.1	4.75	4.75	4.75	0.113	0.0032			

MATERIAL DESCRIPTION	USCS	AASHTO
○ LIMESTONE GRAVEL, TRACE SAND AND SILT/CLAY	GC	A-2-7(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-16 SAMPLE NO. 8

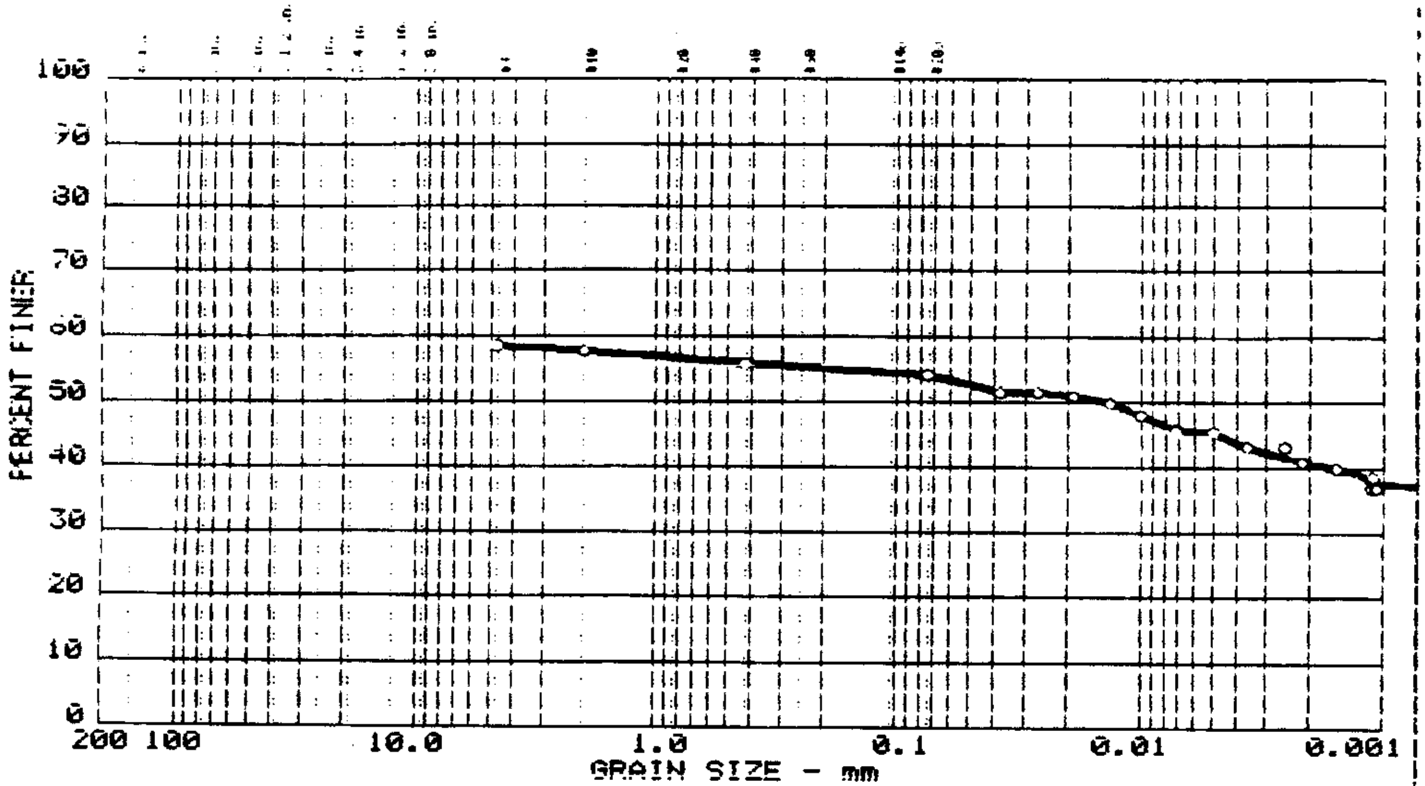
Date: SEPTEMBER 16, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	16	0.0	41.4	4.4	8.7	45.5

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	86.9	58.8	4.750	4.750	0.014					

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY, TRACE SILT AND LIMESTONE GRAVEL.	CH	A-7-5(24)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-16 SAMPLE NO. 11

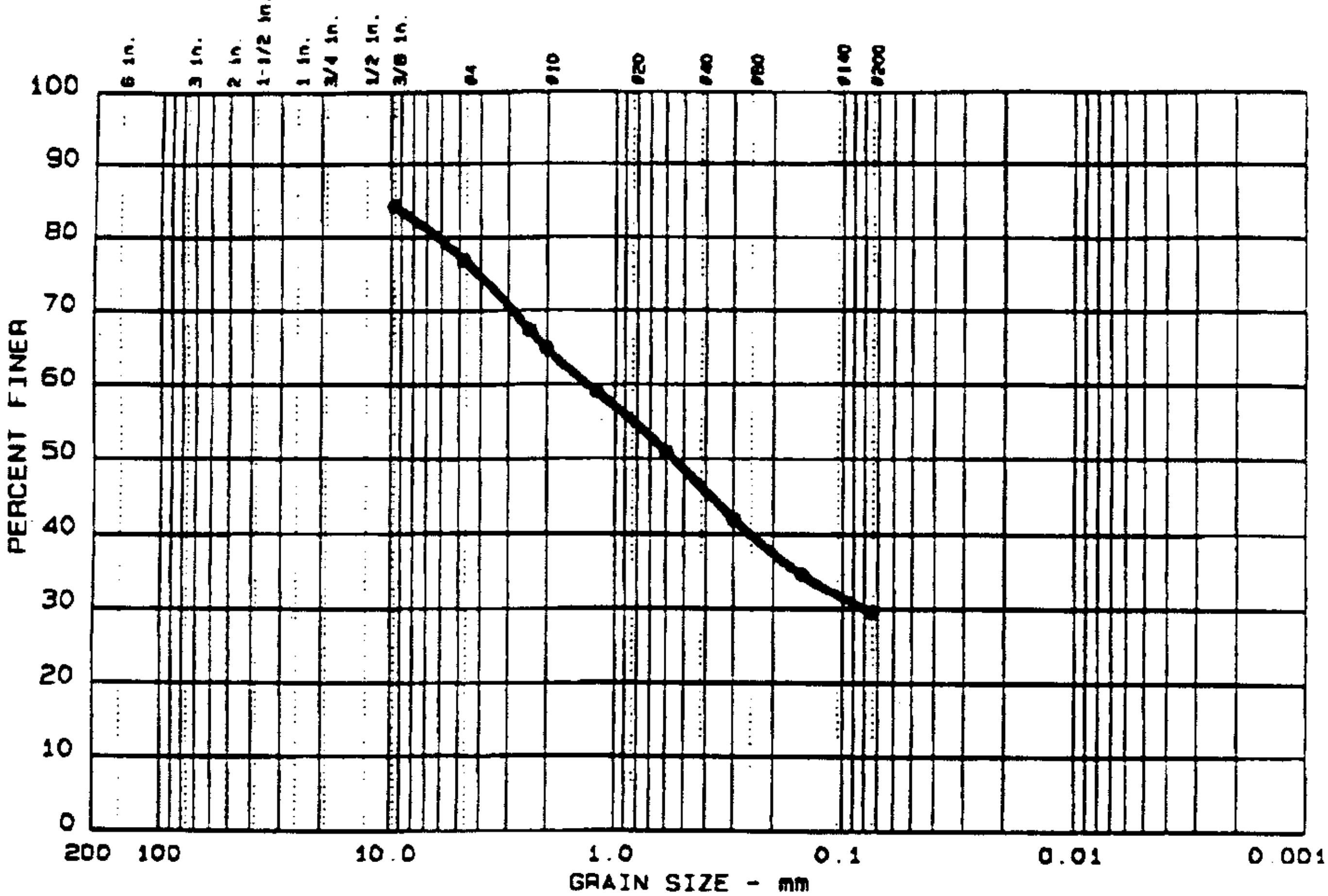
Date: SEPTEMBER 16, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	15	0.0	23.1	47.5	29.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	19.7	4.2	9.52	1.31	0.55	0.081				

MATERIAL DESCRIPTION	USCS	AASHTO
● YELL & VERY PALE ORANGE, SAND, S. FINES, S. GRAV.	SC-SM	A-2-4(0.0)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-18, 10 @ 12 FEET OF DEPTH

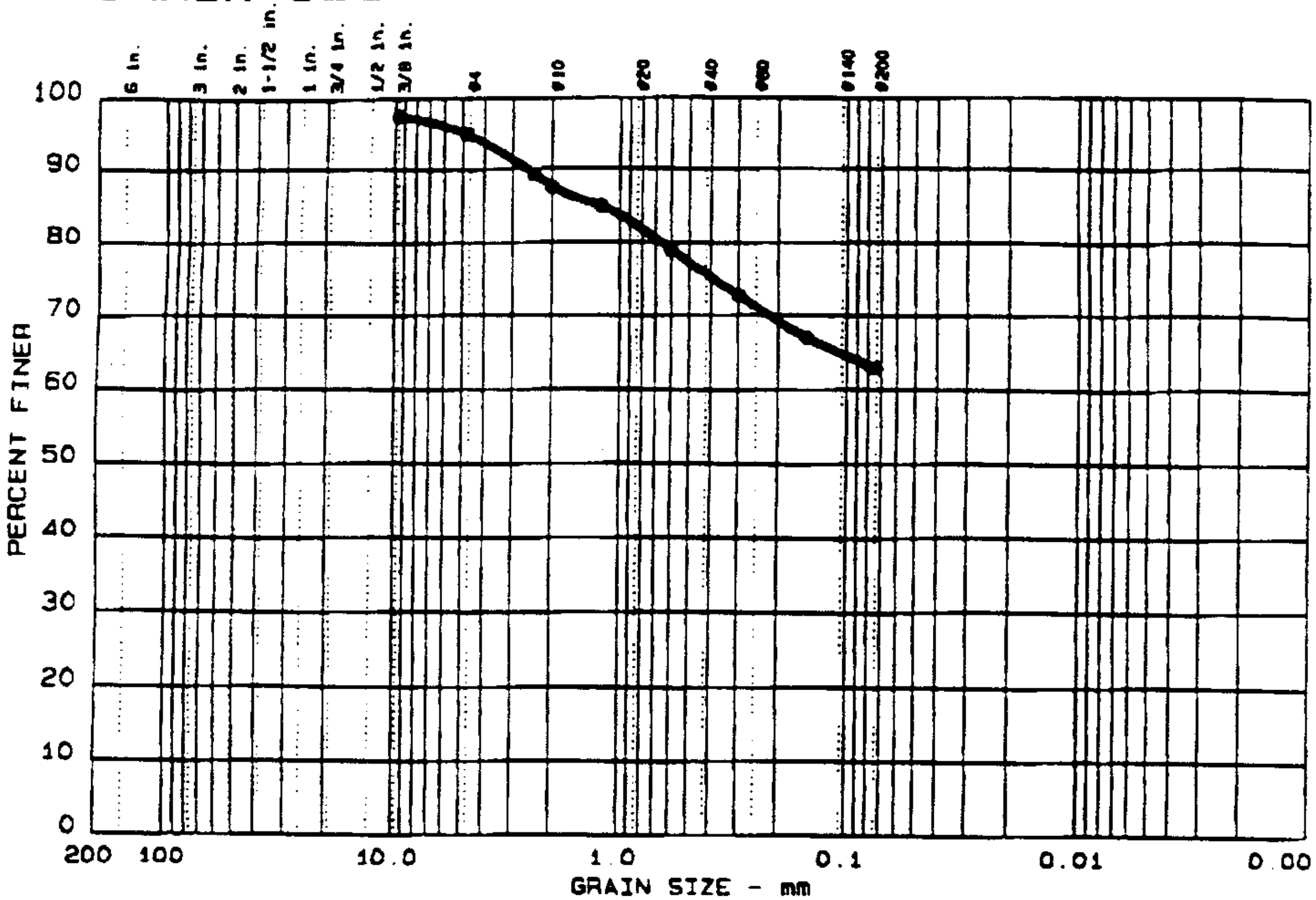
Date: SEPTEMBER 9, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
SOIL TECH

Figure No. 10

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	16	0.0	5.0	32.2	62.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	73.1	56.3	1.20							

MATERIAL DESCRIPTION	USCS	AASHTO
● VERY PALE YELL & YELL. FINES, SOME SAND, TRA GRAV	CH	A-7-6(32 3)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-18, 20 @ 22 FEET OF DEPTH

Date: SEPTEMBER 9, 1994

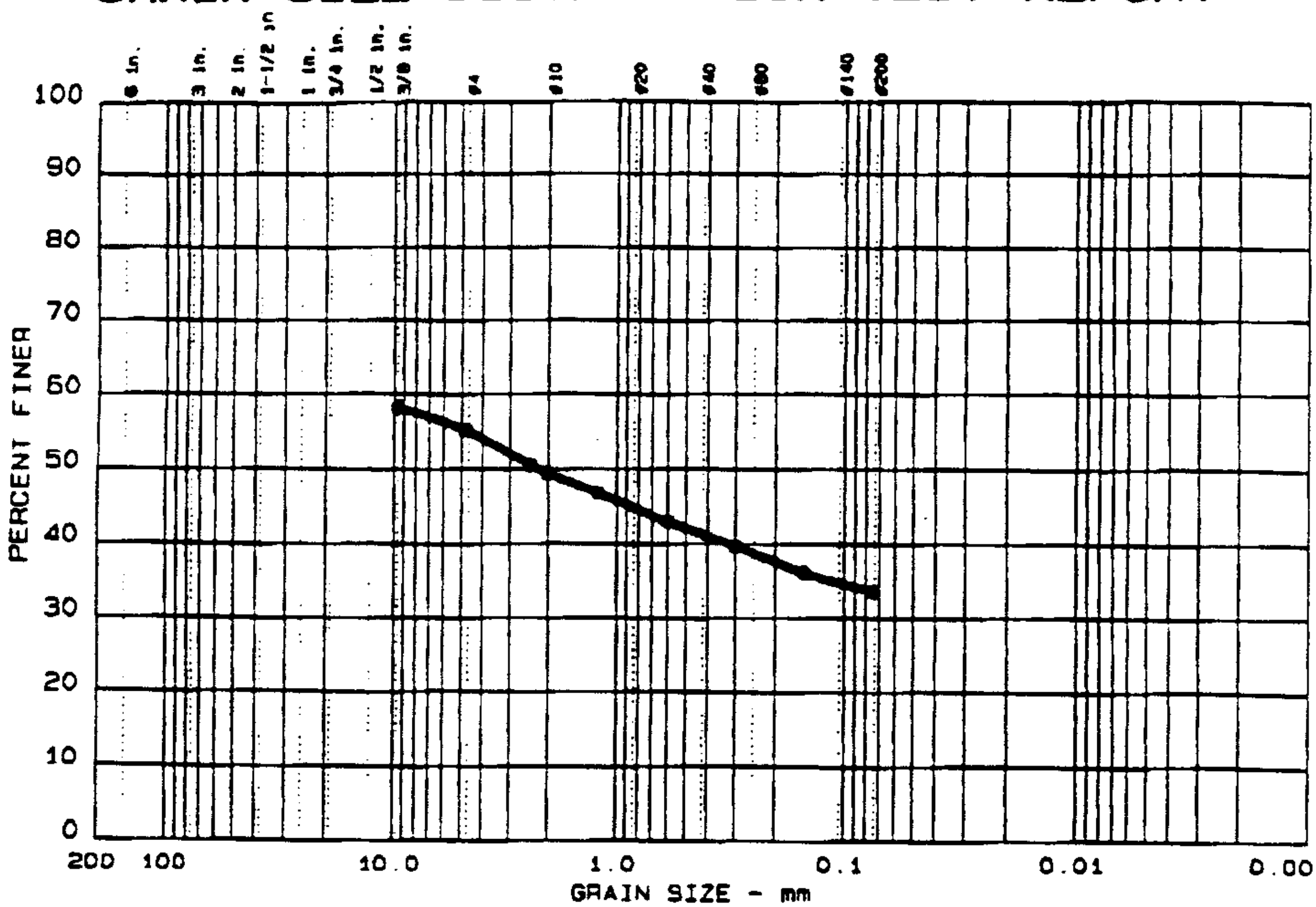
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

SOIL TECH

Figure No. 11

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	17	0.0	44.9	21.5	33.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			9.52	9.52	2.23					

MATERIAL DESCRIPTION	USCS	AASHTO
● BROWN & PALE YELL. ORANGE. FINES, S. GRAV, S SAND	GM	

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-18, 30 @ 32 FEET OF DEPTH

Date: SEPTEMBER 9, 1994

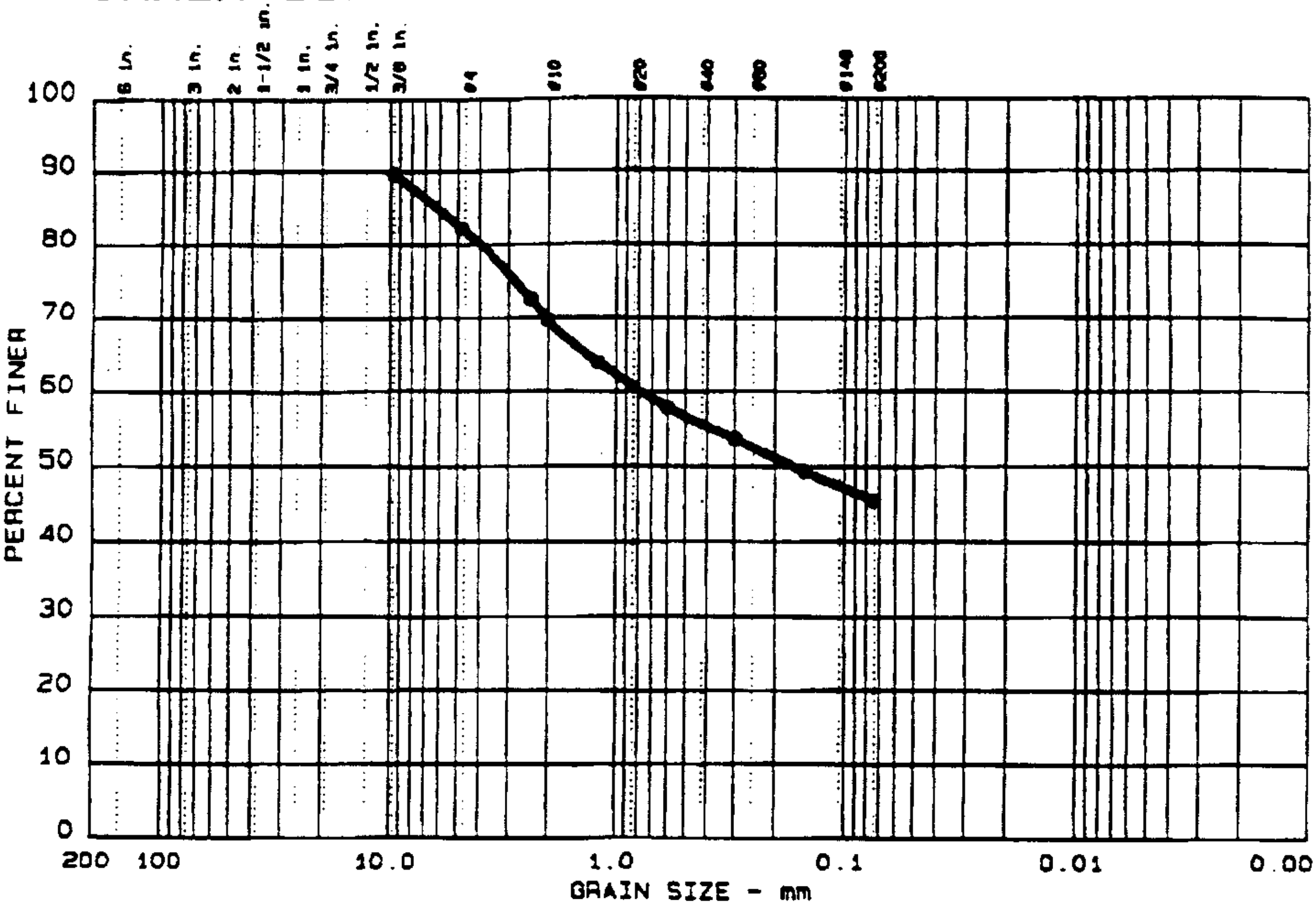
GRAIN SIZE DISTRIBUTION TEST REPORT

SOIL TECH

Remarks:

Figure No. 12

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	19	0.0	17.8	36.7	45.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	28.3	11.7	6.10	0.78	0.17					

MATERIAL DESCRIPTION	USCS	AASHTO
● YELLOW & PALE YELLOW. ORANGE. FINES. SOME SAND	SC	A-6(2.2)

Project No.: 941979
Project: COMMONWEALTH OIL REFINING COMPANY INC.
● Location: PD-18, 39 @ 41 FEET OF DEPTH

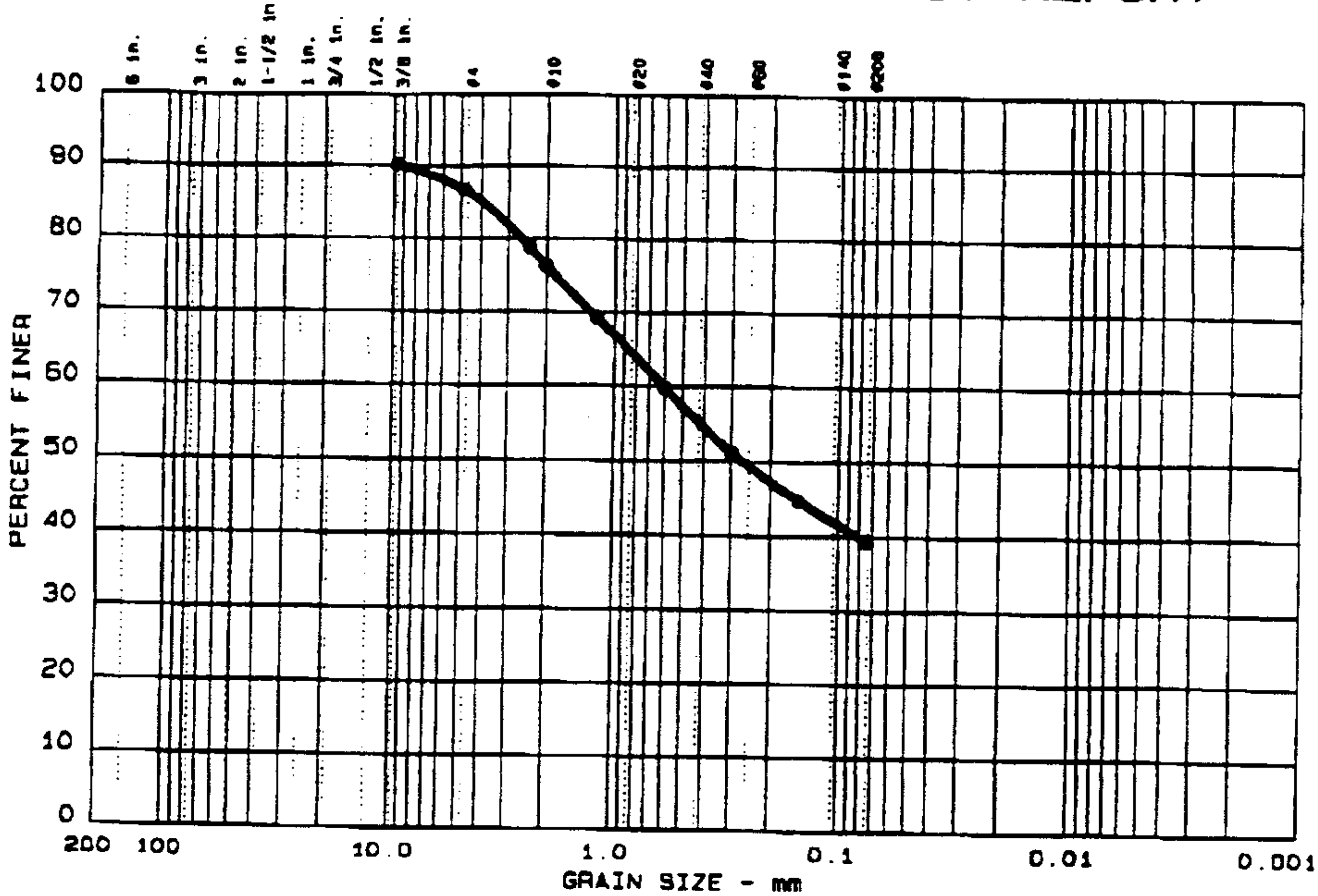
Date: SEPTEMBER 9, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
SOIL TECH

Figure No. 14

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	20	0.0	13.5	47.3	39.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	22.5	5.8	3.94	0.60	0.26					

MATERIAL DESCRIPTION	USCS	AASHTO
● YELLOW & PALE YELL. ORANGE, SAND, S. FINES, S GRA	SC-SM	A-4 (0.0)

Project No.: 941979

Project: COMMONWEALTH OIL REFINING COMPANY INC.

● Location: PD-18, 44 @ 46 FEET OF DEPTH

Date: SEPTEMBER 9, 1994

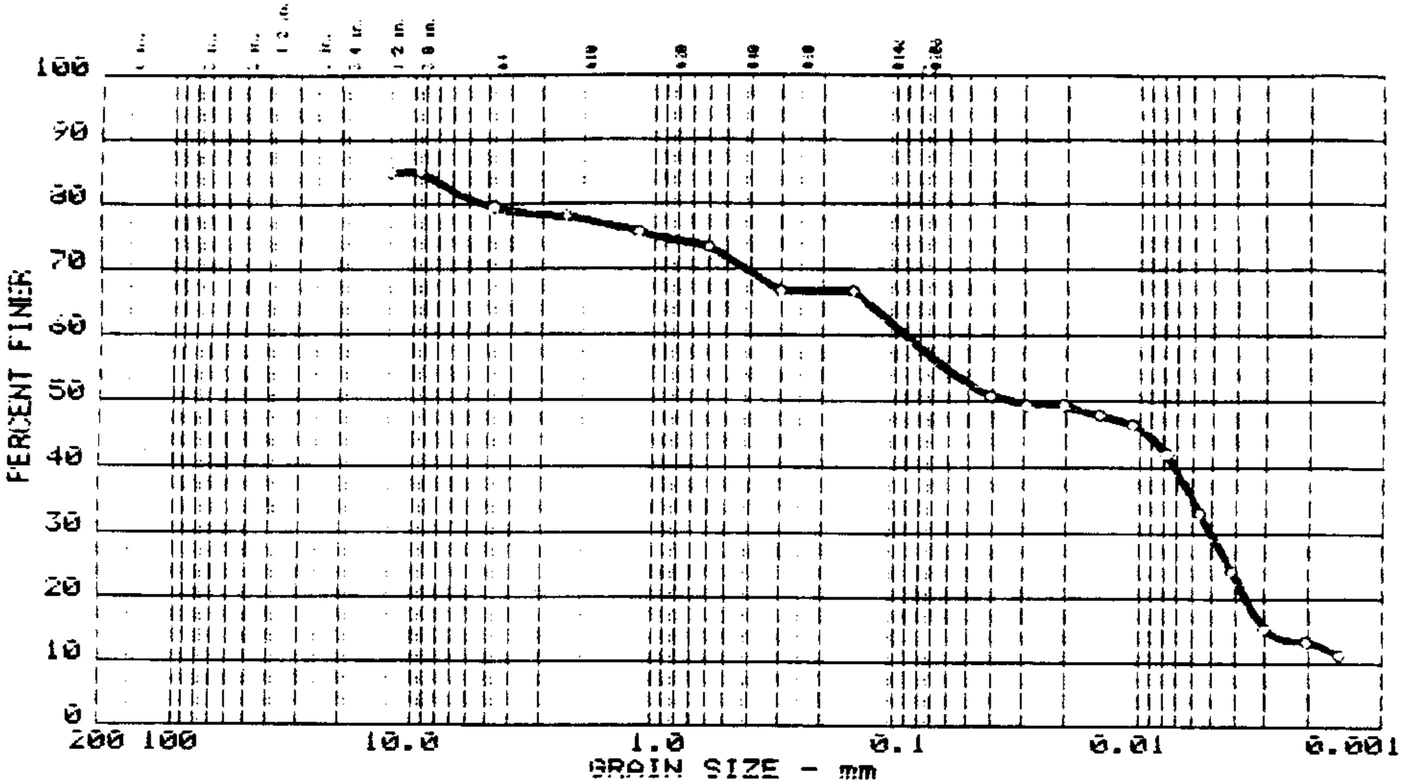
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

SOIL TECH

Figure No. 15

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 17	0.0	20.4	22.2	27.6	29.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○ 23.2	13.9	9.441	0.090	0.032	0.005	0.0029			

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY/SILT, SOME SAND, SOME LIMESTONE GRAVEL	CL	A-6(10)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-19 SAMPLE NO. 5

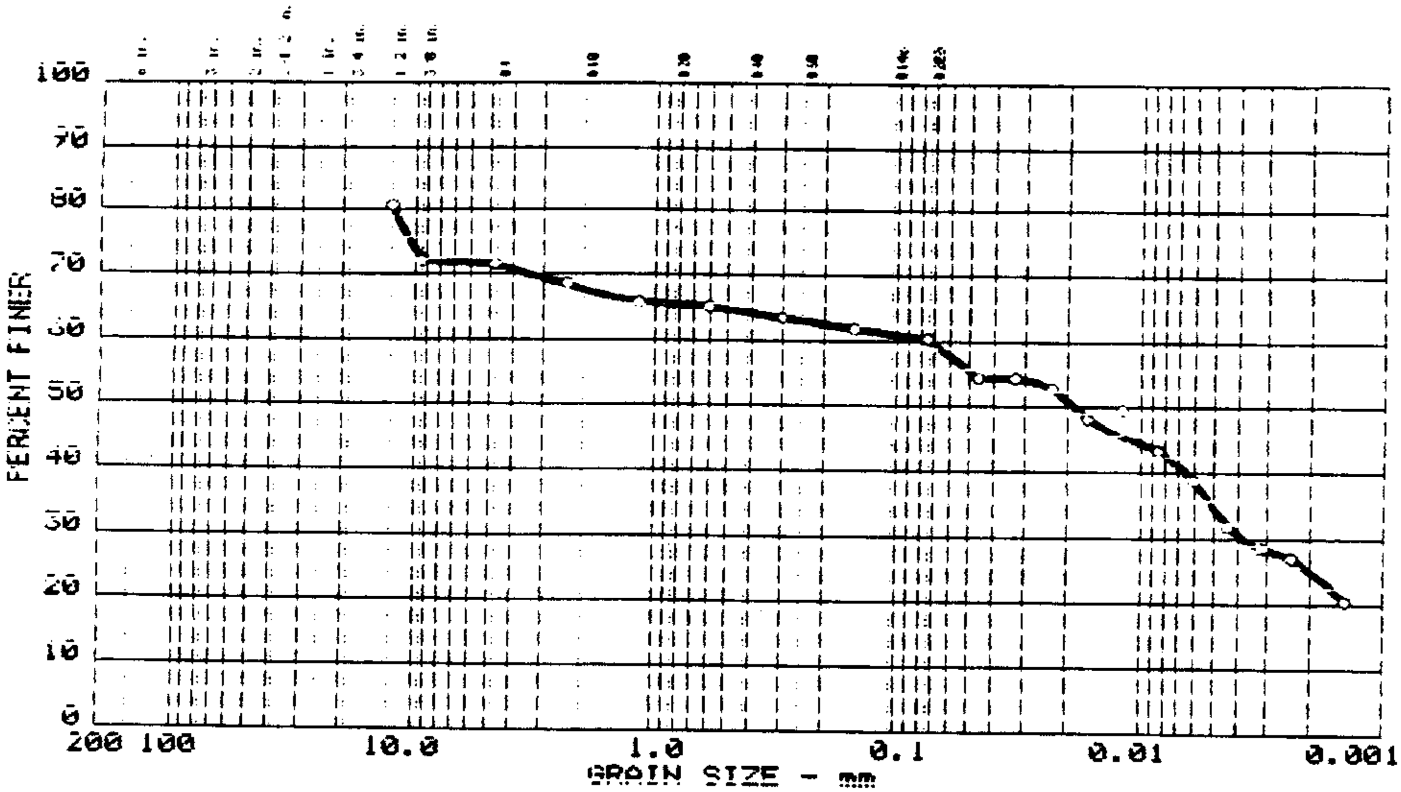
Date: SEPTEMBER 16, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 18	0.0	28.4	11.2	25.9	34.5

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○ 23.3	16.9	12.700		0.019	0.004				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY AND LIMESTONE GRAVEL, SOME SAND.	CL	A-6(6)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-19 SAMPLE NO. 7

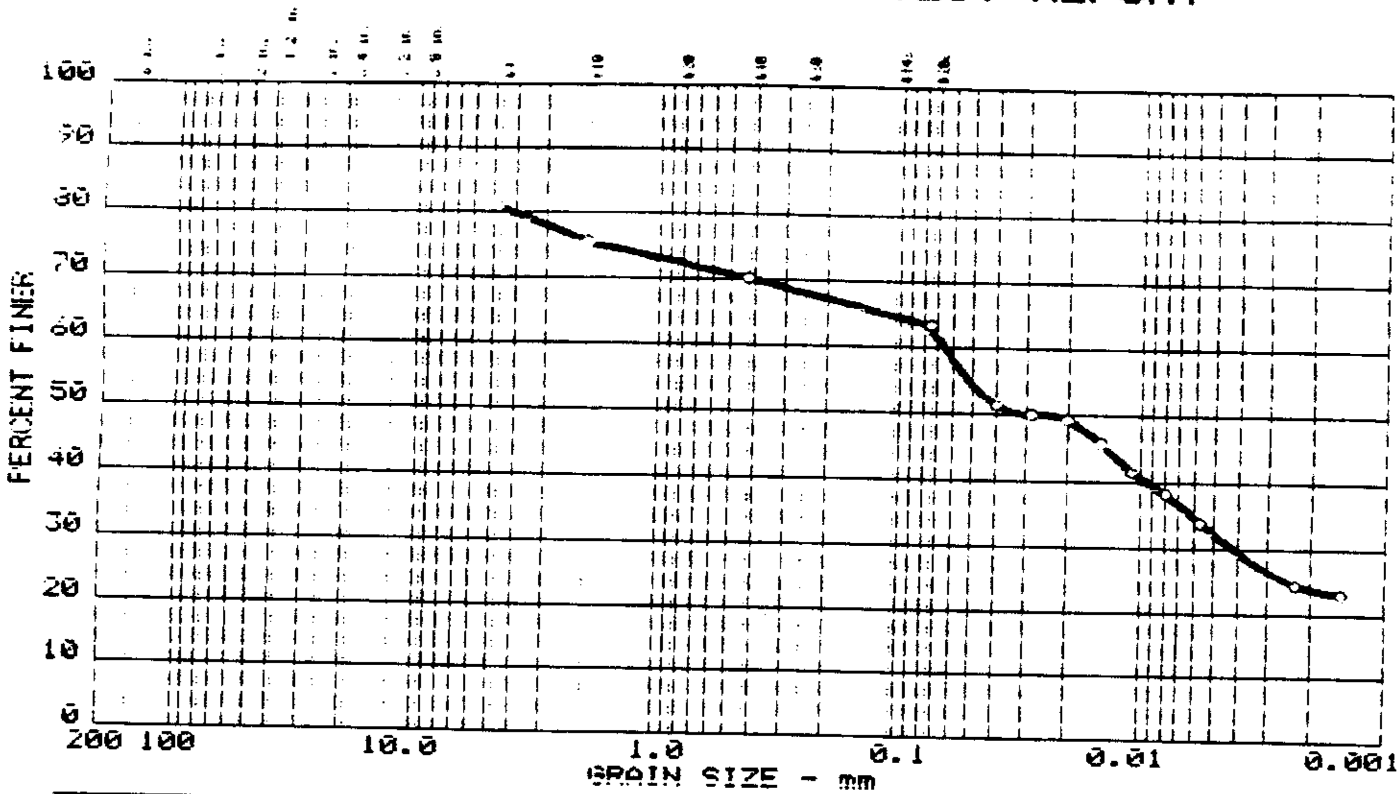
Date: SEPTEMBER 16, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
19	0.0	19.2	17.5	31.0	32.3

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
45.5	29.9	4.750		0.025	0.004				

MATERIAL DESCRIPTION	USCS	AASHTO
SILT/CLAY SOME SAND, SOME LIMESTONE GRAVEL.	CL	A-7-6(11)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-19 SAMPLE NO. 8

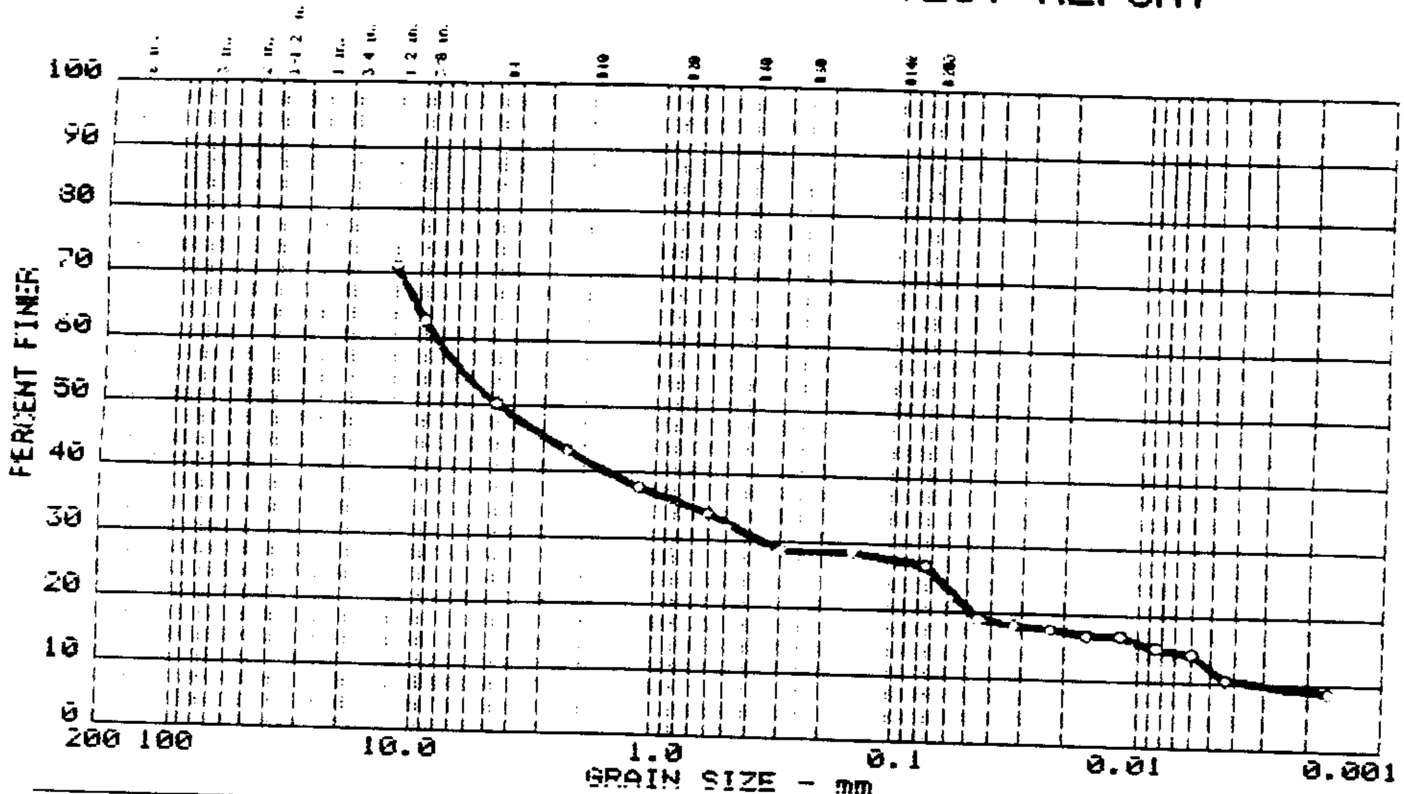
Date: SEPTEMBER 17, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 20	0.0	49.8	23.2	14.9	12.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	21.5	9.1	12.70	8.39	4.66	0.354	0.0080	0.0034	4.42	2483.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAYEY SAND AND LIMESTONE GRAVEL.	GC	A-2-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-19 SAMPLE NO. 11

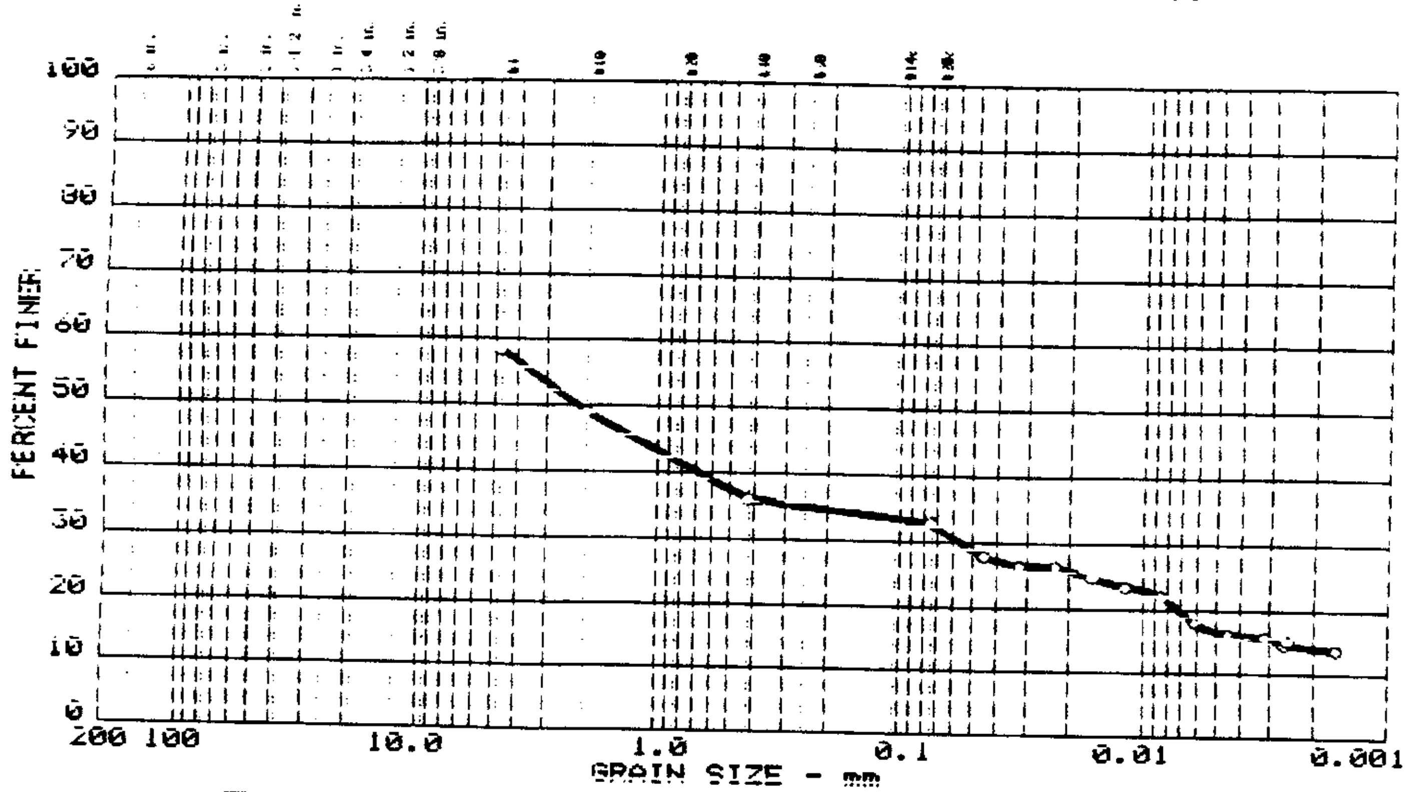
Date: SEPTEMBER 16, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
15	0.0	41.6	25.5	16.3	16.6

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
30.7	14.1	4.75	4.75	2.17	0.056	0.0027			

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY LIMESTONE GRAVEL, SOME SILT, SOME CLAY.	GC	A-2-6(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-19 SAMPLE NO. 15

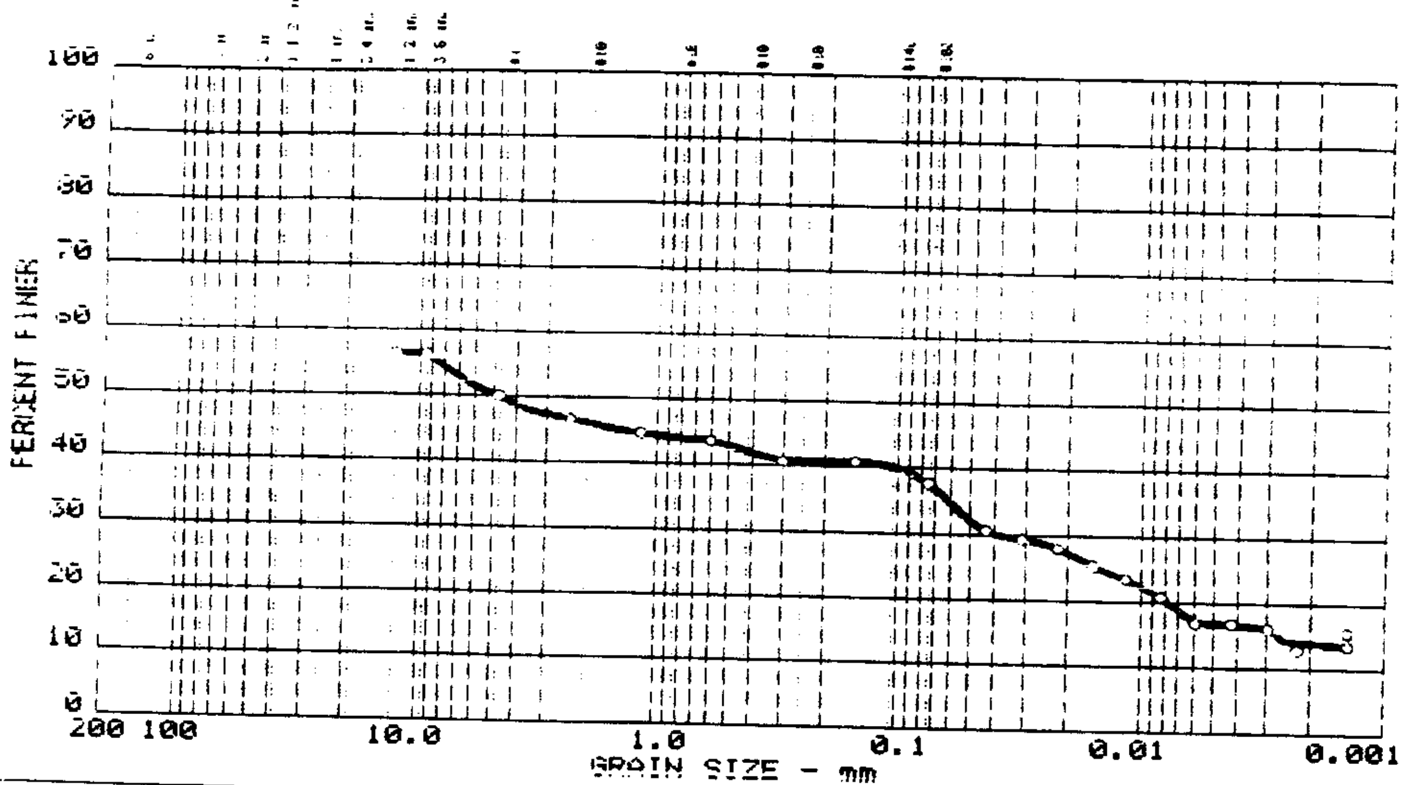
Date: SEPTEMBERT 17, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
1	0.0	50.0	12.3	20.7	17.0

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
25.3	8.5	12.70	12.70	4.72	0.038	0.0027			

MATERIAL DESCRIPTION	USCS	AASHTO
LIMESTONE GRAVEL, SOME SAND, SOME SILT/CLAY.	GC	A-4(1)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-19 SAMPLE NO. 16

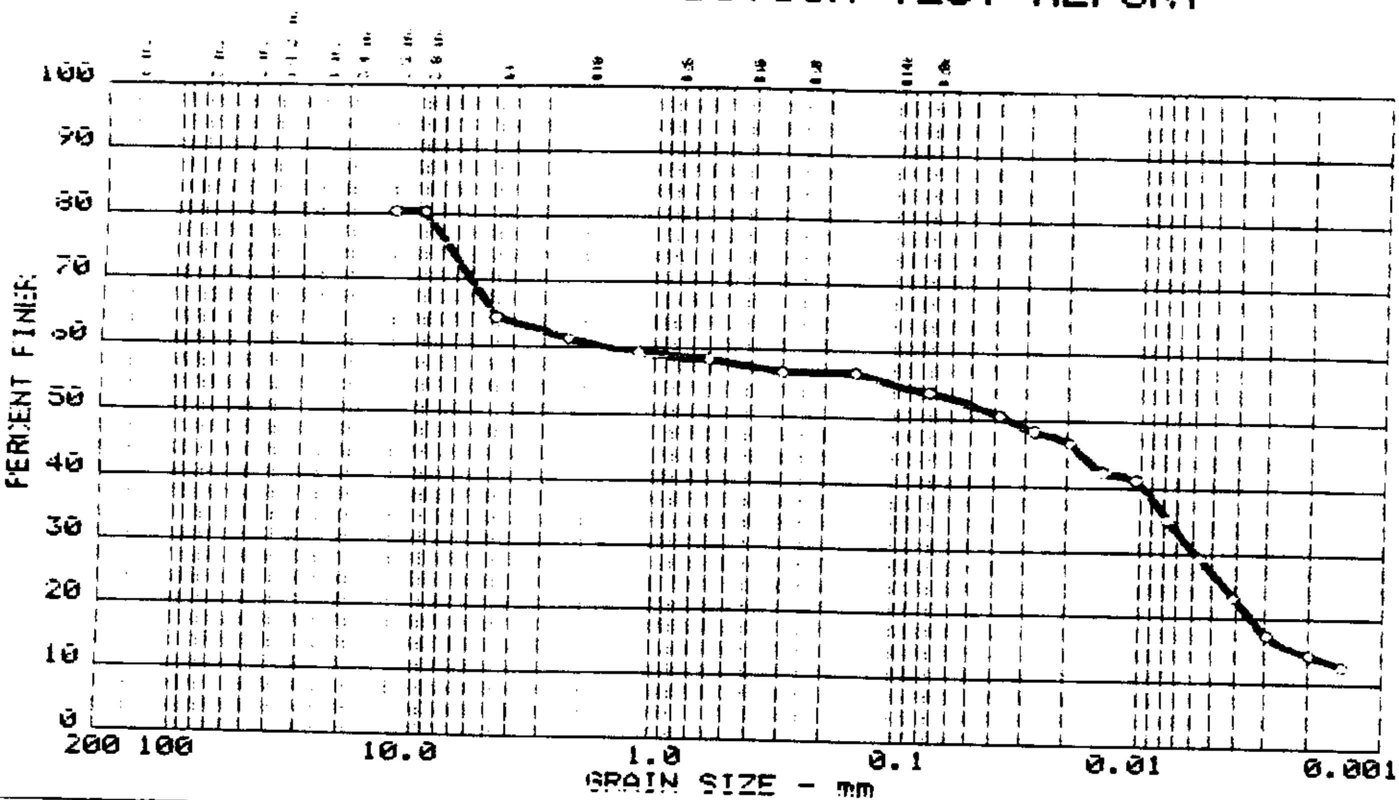
Date: SEPTEMBER 16, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 6

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 2	0.0	35.6	10.4	26.8	27.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	32.9	14	12.700	1.599	0.035	0.006	0.0022			

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAY/SILT AND LIMESTONE GRAVEL, TRACE SAND.	CL	A-6(4)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-19 SAMPLE NO. 19

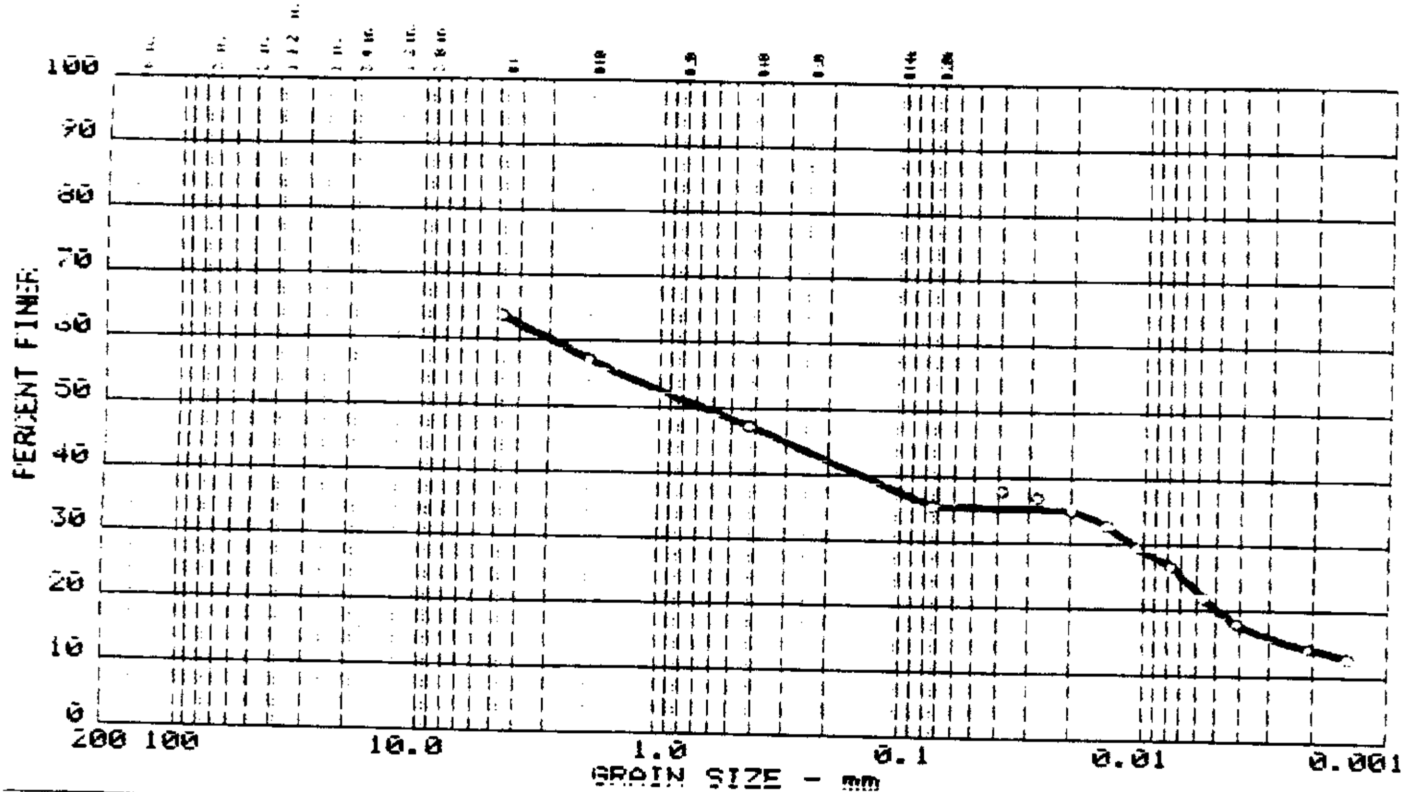
Date: SEPTEMBER 17, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.7

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
3	0.0	36.2	28.3	15.4	20.1

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
32.6	14.9	4.75	2.93	0.63	0.011	0.0025			

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY LIMESTONE GRAVEL, SOME SILT, SOME CLAY	GC	A-6(1)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-20 SAMPLE NO. 3

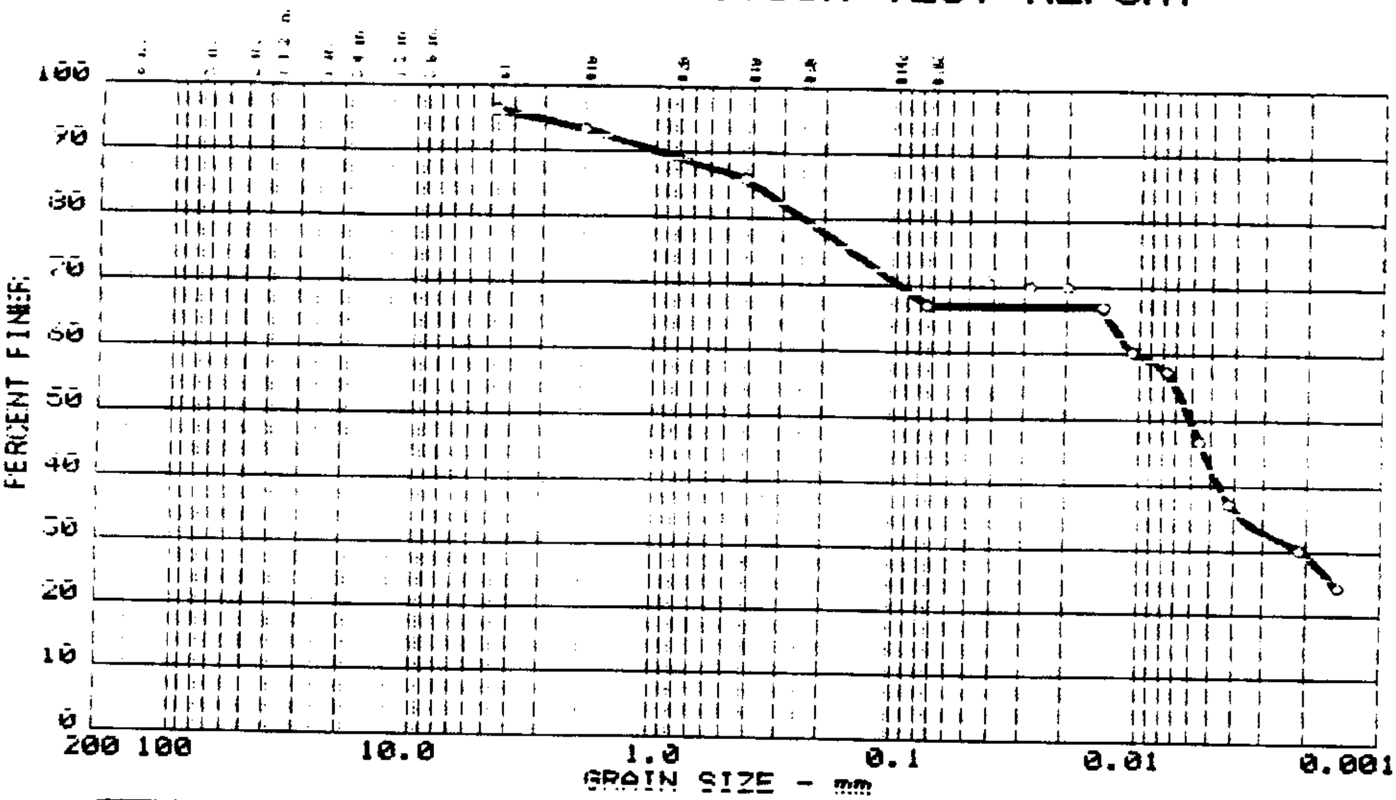
Date: SEPTEMBER 17, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 4	0.0	3.7	29.1	24.8	42.4

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○ 26.7	11.7	0.385		0.006	0.002				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY SAND TRACE LIMESTONE GRAVEL	CL	A-6(13)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-20 SAMPLE NO. 7

Date: SEPTEMBER 17, 1994

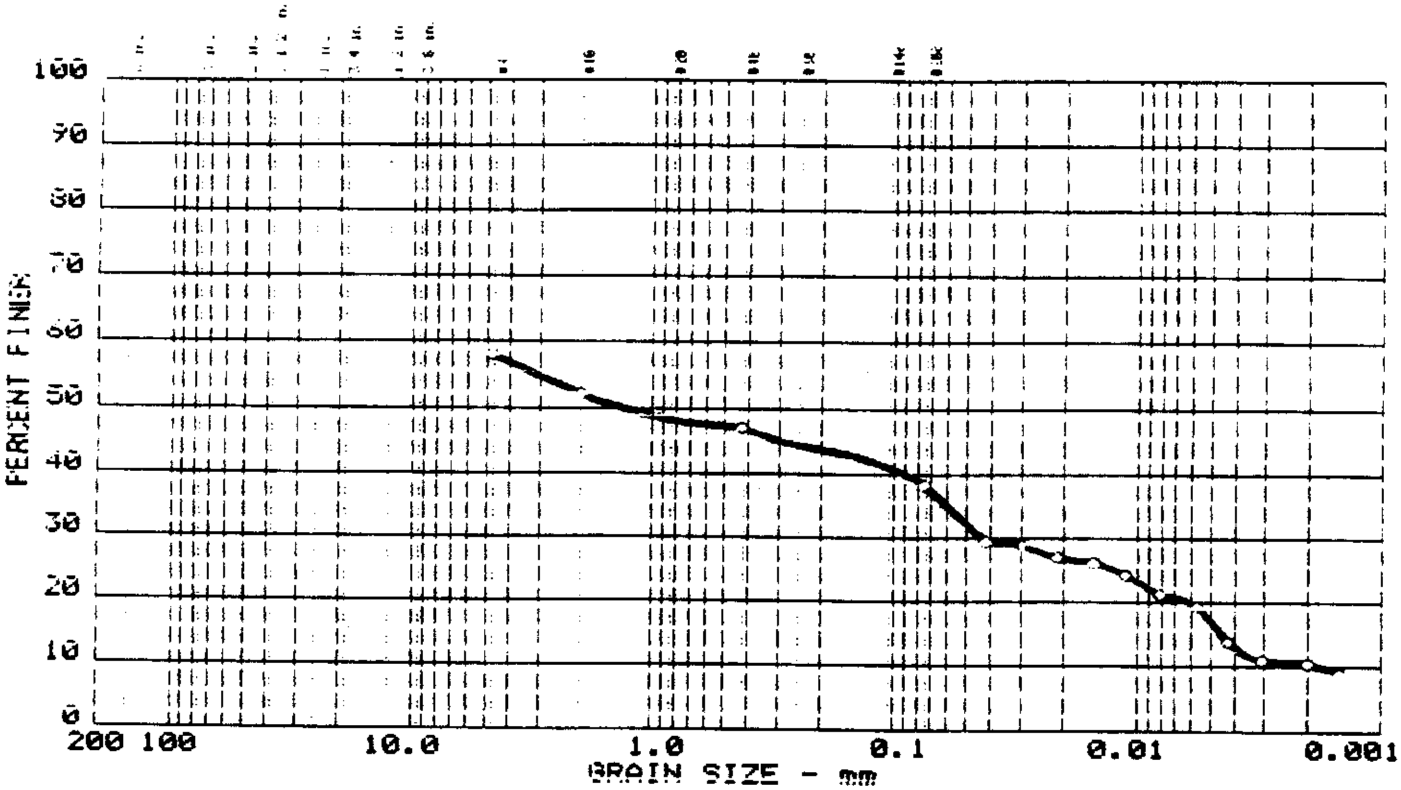
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 6	0.0	41.9	19.7	21.4	17.0

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○ 26.9	3.1	4.75	4.75	1.25	0.043	0.0045	0.0017	0.23	2722.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ LIMESTONE GRAVEL, SOME SAND, SOME SILT SOME CLAY.	GM	A-4(1)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING FD-20 SAMPLE NO. 19

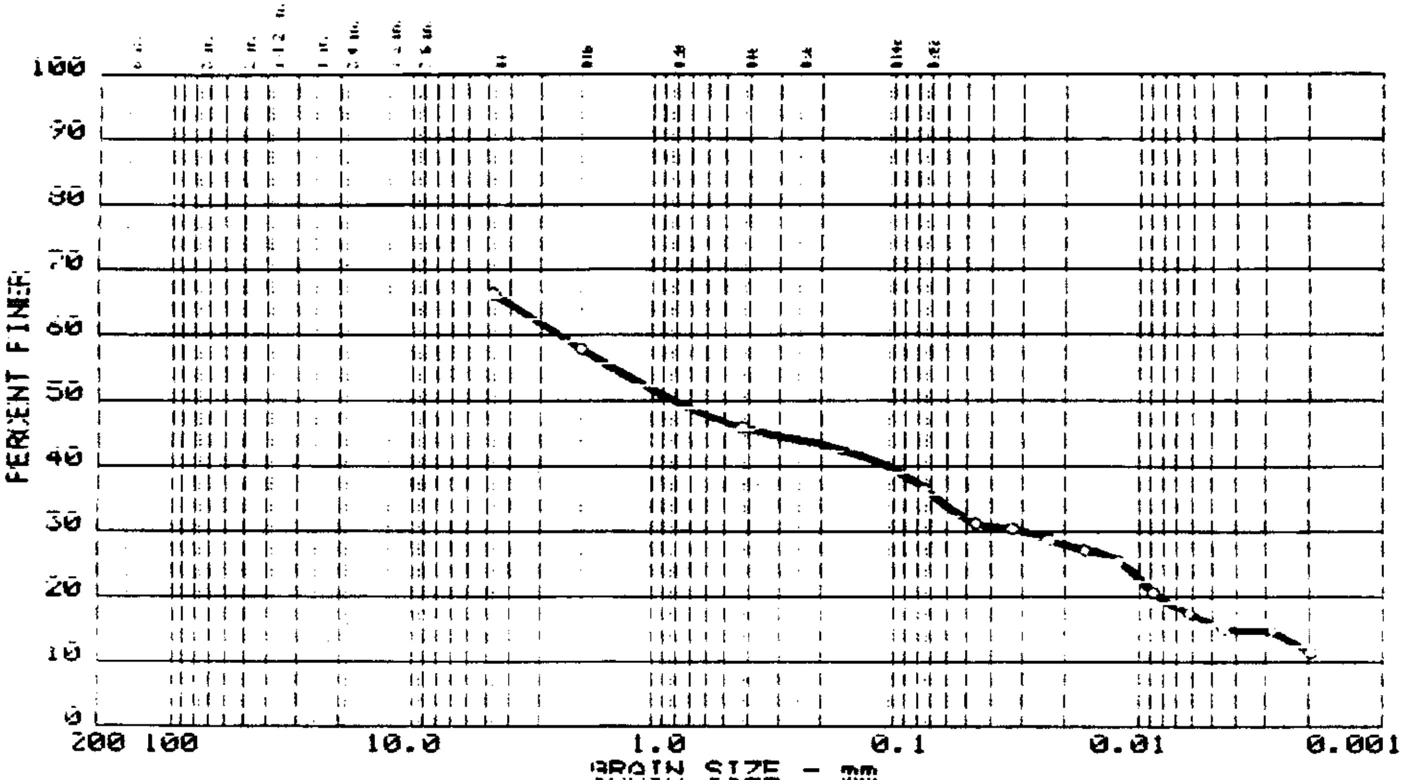
Date: SEPTEMBER 17, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 7	0.0	33.7	29.7	20.7	15.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	22.9	12.2	4.75	2.46	0.79	0.029	0.0040			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY LIMESTONE GRAVEL, SOME SILT, SOME CLAY.	GC	A-6(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-20 SAMPLE NO. 20

Date: SEPTEMBER 19, 1994

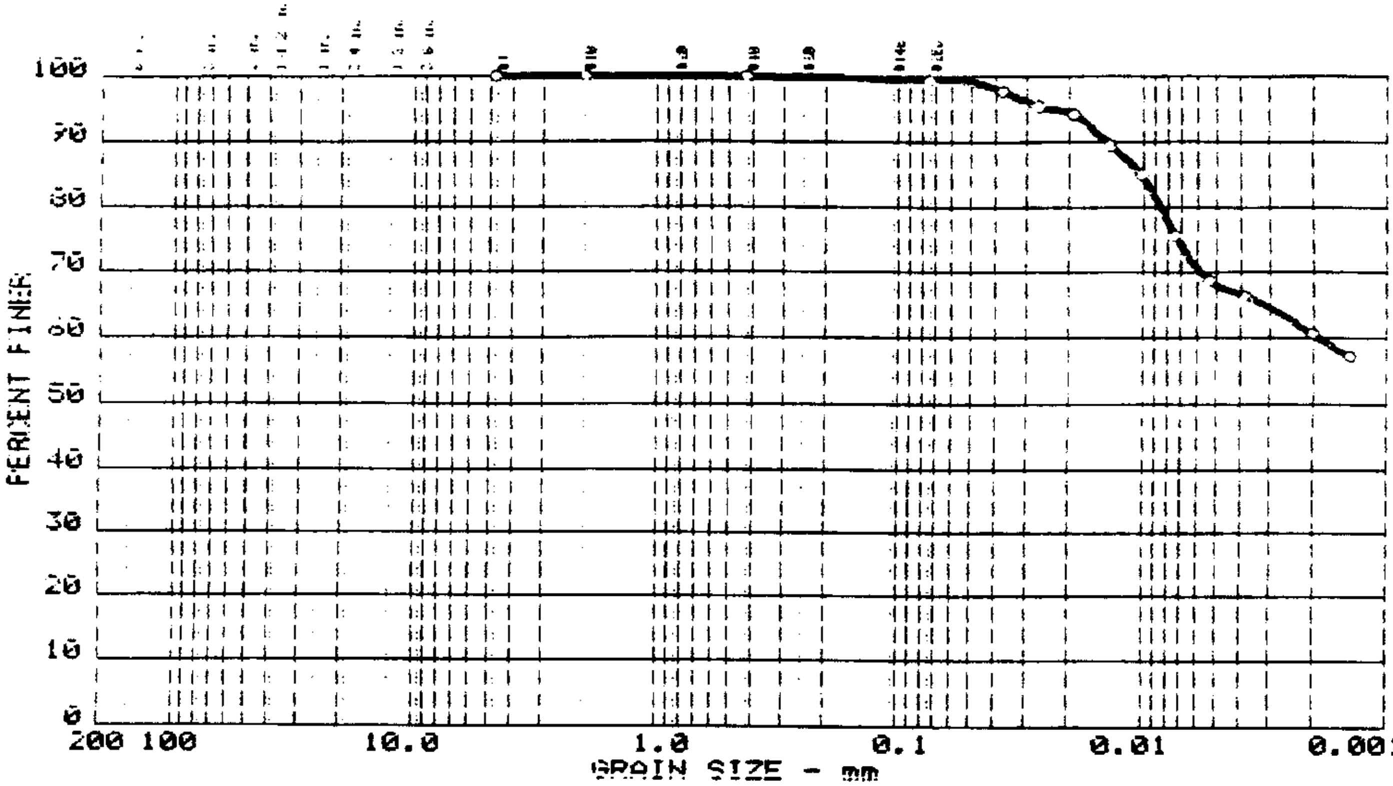
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 0	0.0	0.0	0.5	31.6	67.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	81.1	58.9								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, LITTLE SAND.	CH	A-7-6(26)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-21 SAMPLE NO. 4

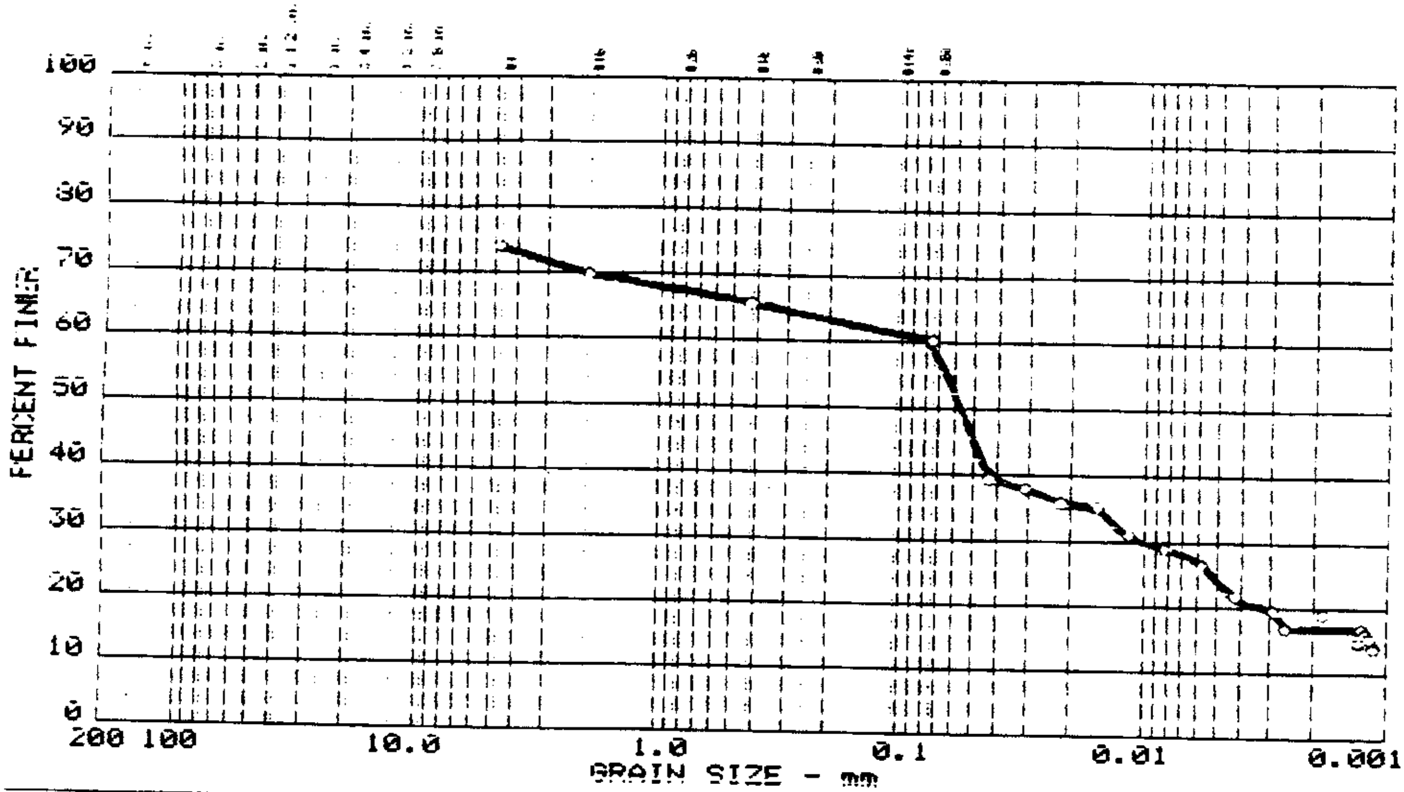
Date: SEPTEMEBER 19, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
7	0.0	26.1	13.6	36.2	24.1

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
27.2	11	4.750		0.057	0.010	0.0011			

MATERIAL DESCRIPTION	USCS	AASHTO
SILT/CLAY AND LIMESTONE GRAVEL, SOME SAND.	CL	A-6(4)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-21 SAMPLE NO. 5

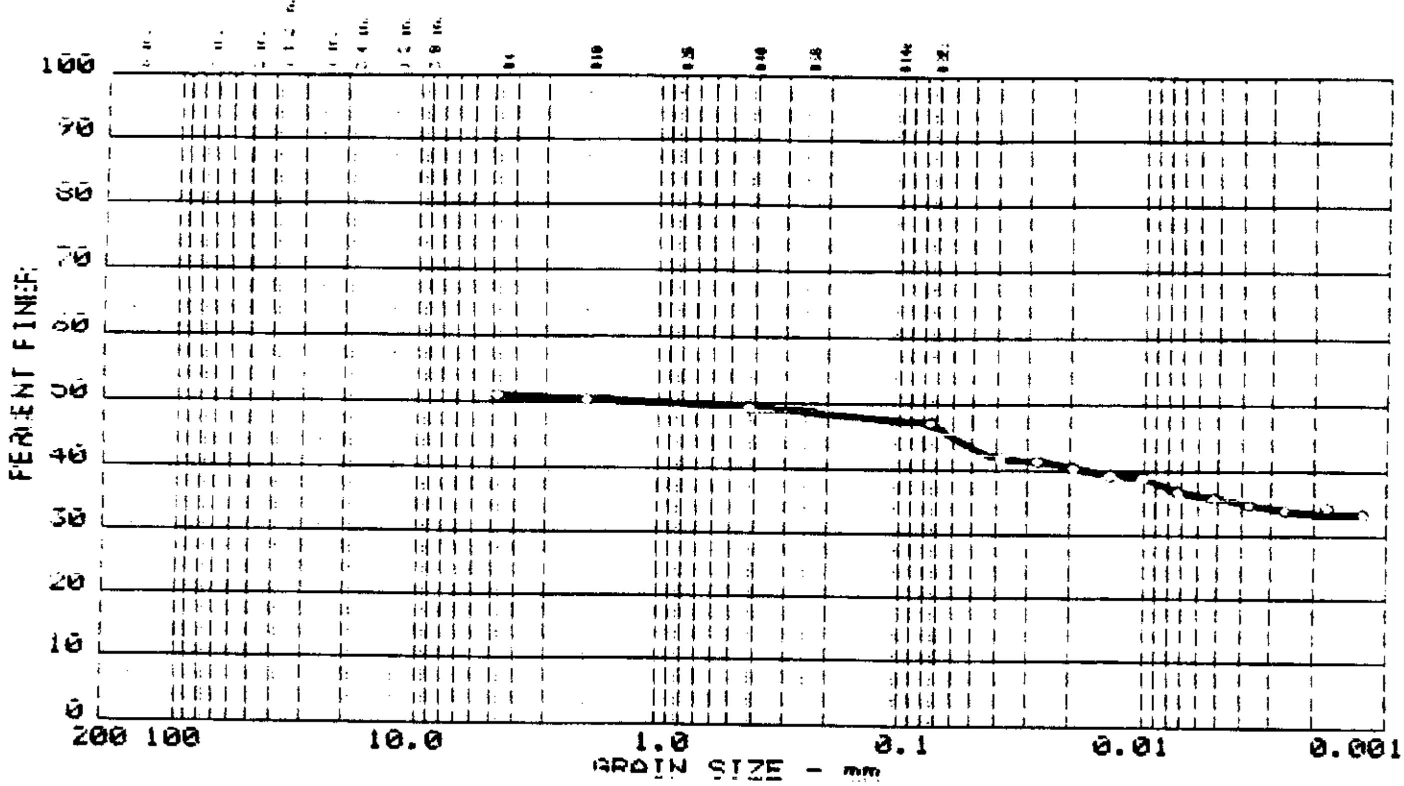
Date: SEPTEMBER 19, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
10	0.0	48.9	3.9	11.3	35.9

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
36.5	62.98	4.75	4.75	0.88					

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAY AND LIMESTONE GRAVEL, TRACE SAND.	GC	A-7-6(22)

Project No.. DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-21 SAMPLE NO. 6

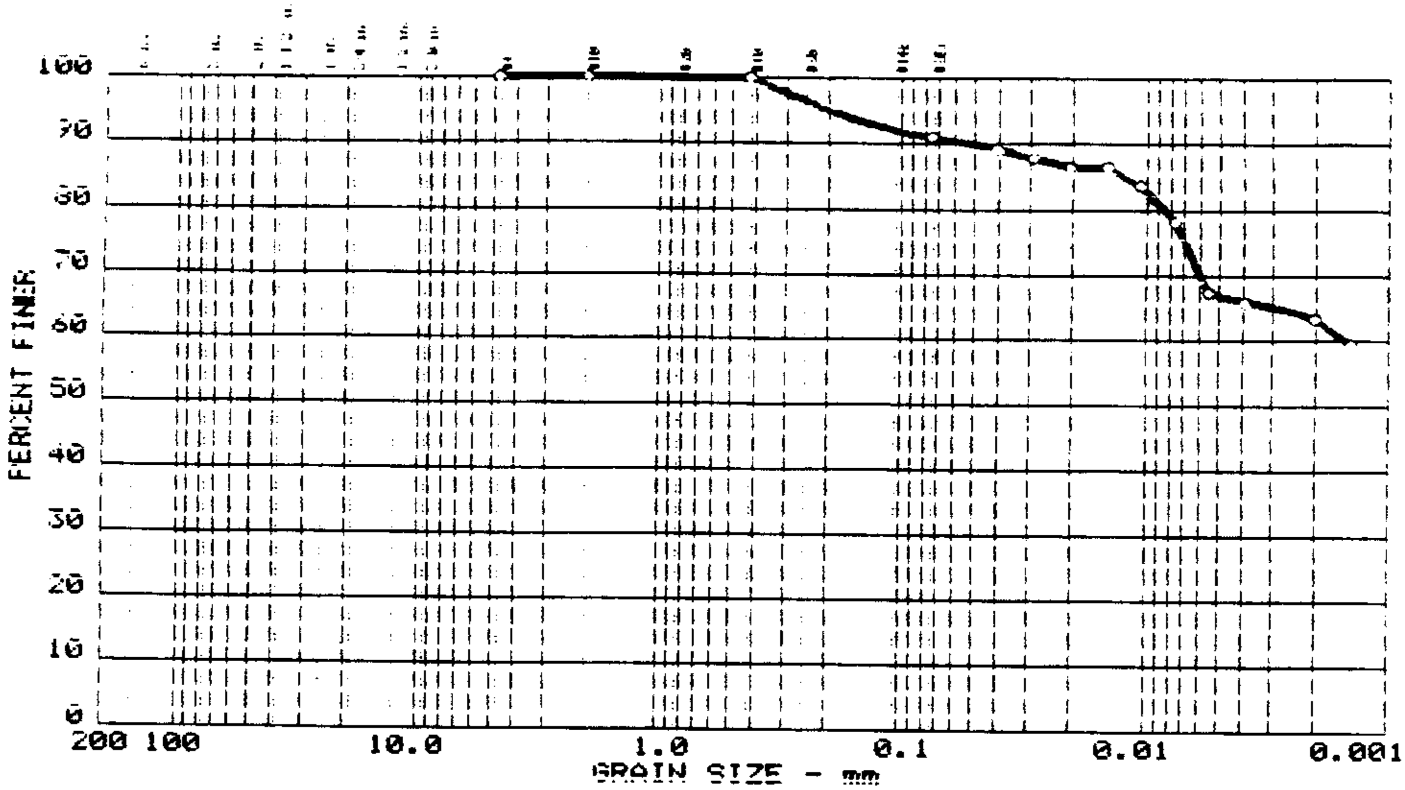
Date: SEPTEMBER 19, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	11	0.0	0.0	8.9	24.2	66.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	78.2	59.1								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, TRACE SAND.	CH	A-7-6(26)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-21 SAMPLE NO. 13

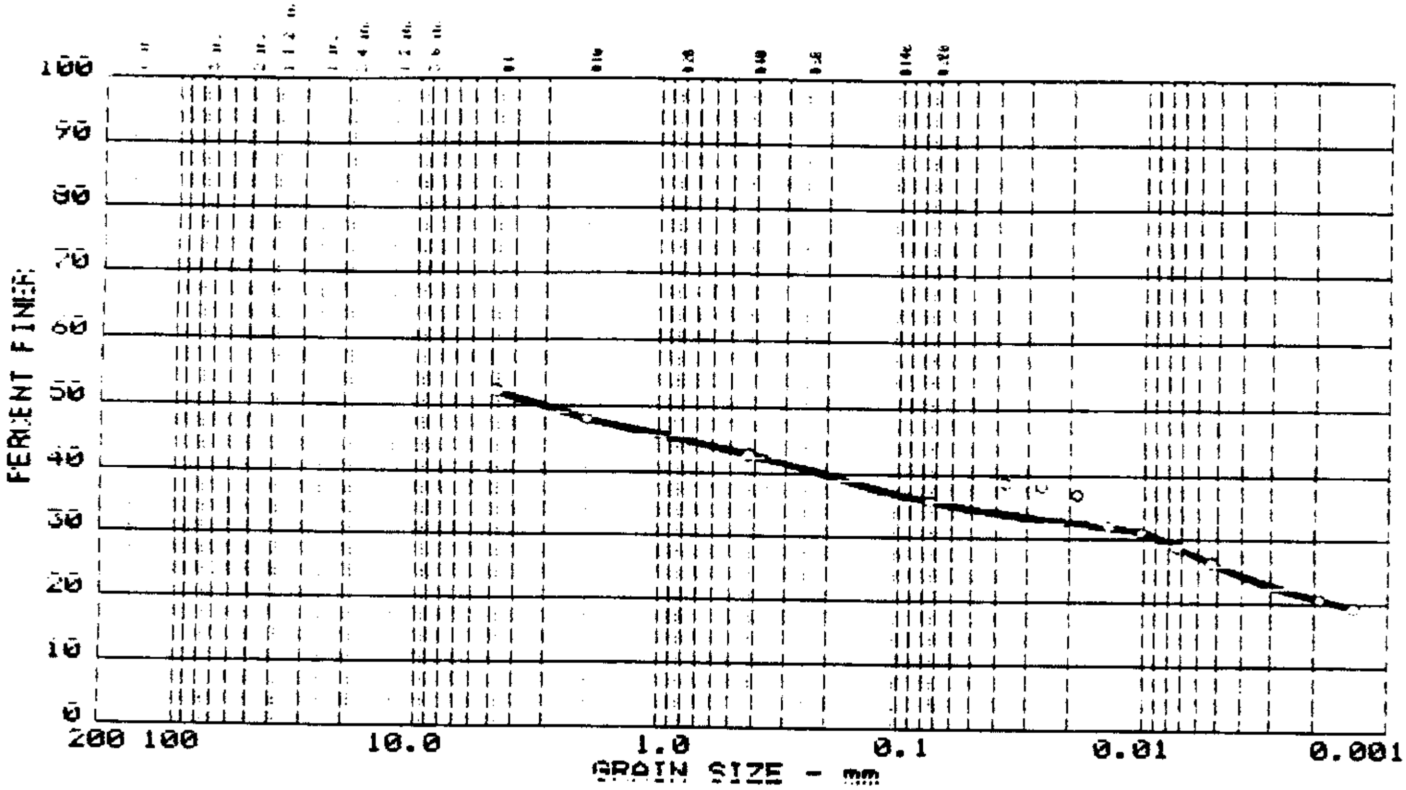
Date: SEPTEMBER 19, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
12	0.0	47.7	16.5	10.0	25.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
36	21.7	4.75	4.75	2.96	0.009				

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY LIMESTONE GRAVEL, TRACE SILT, SOME SAND.	GC	A-6(3)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-21 SAMPLE NO. 15

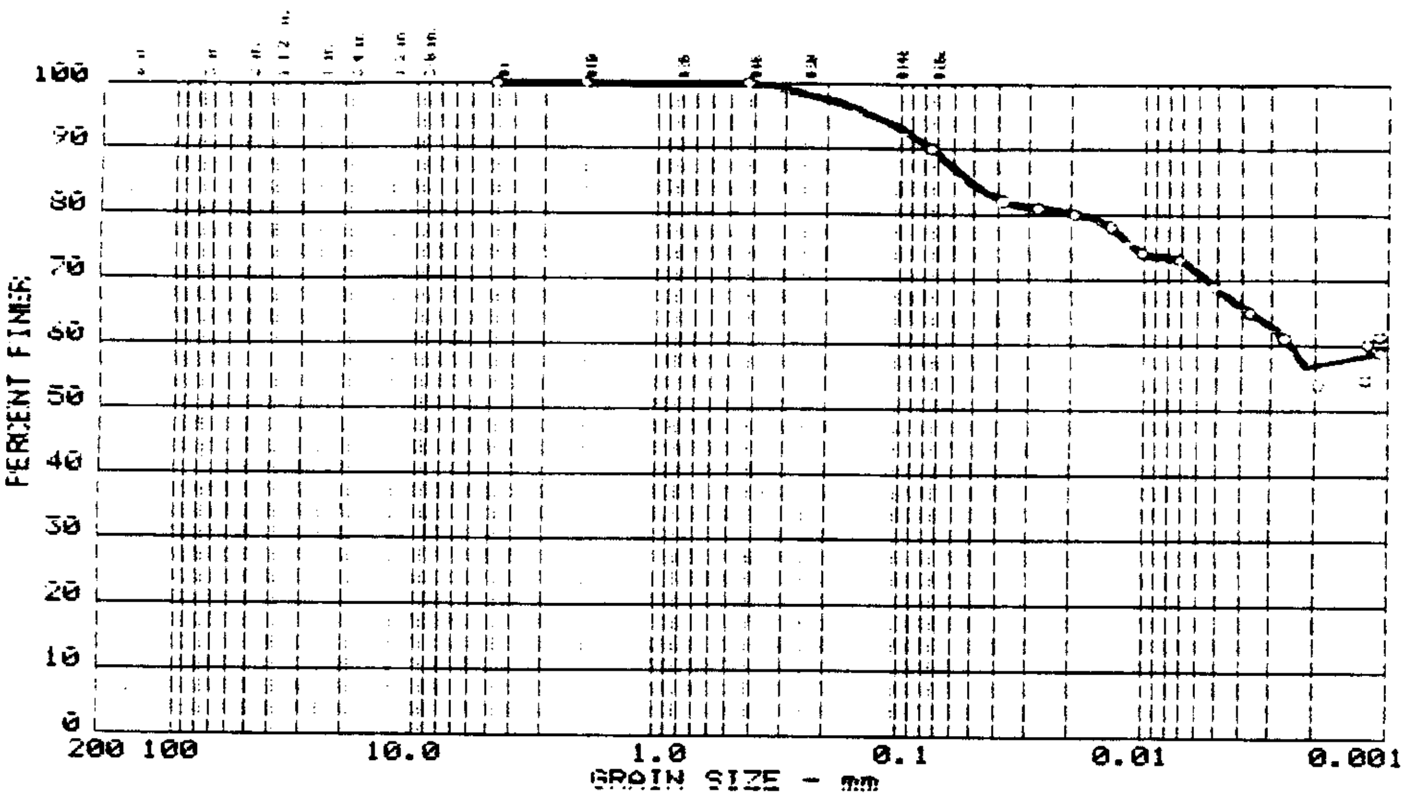
Date: SEPTEMBER 19, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	0.0	0.0	10.0	21.4	68.6

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	50.8	42.06								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, TRACE FINE SAND.	CH	A-7-6(41)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-21 SAMPLE NO. 17

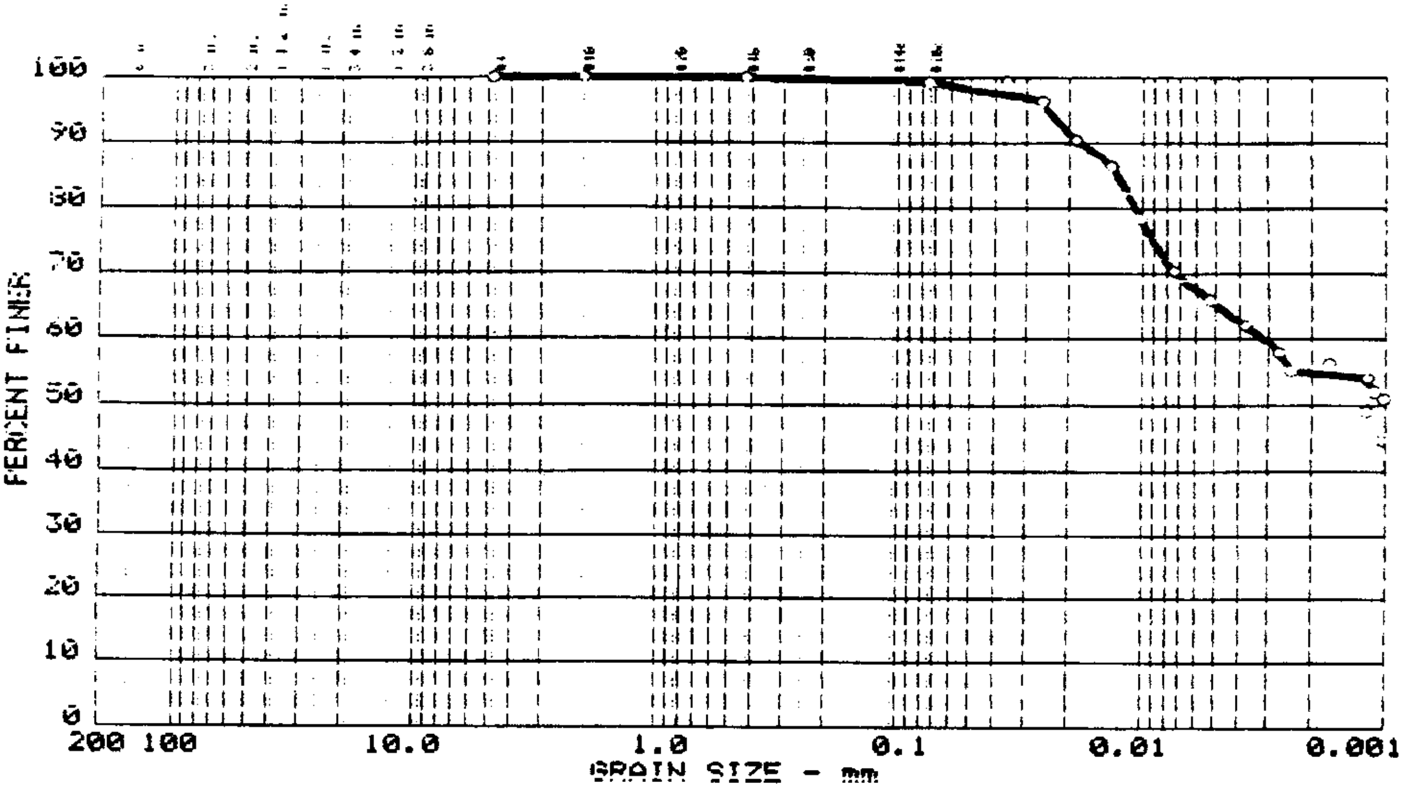
Date: SEPTEMBER 19, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.6

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 14	0.0	0.0	0.6	34.0	65.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	65.7	47.4								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY.	CH	A-7-6(52)

Project No.: DSSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-21 SAMPLE NO. 21

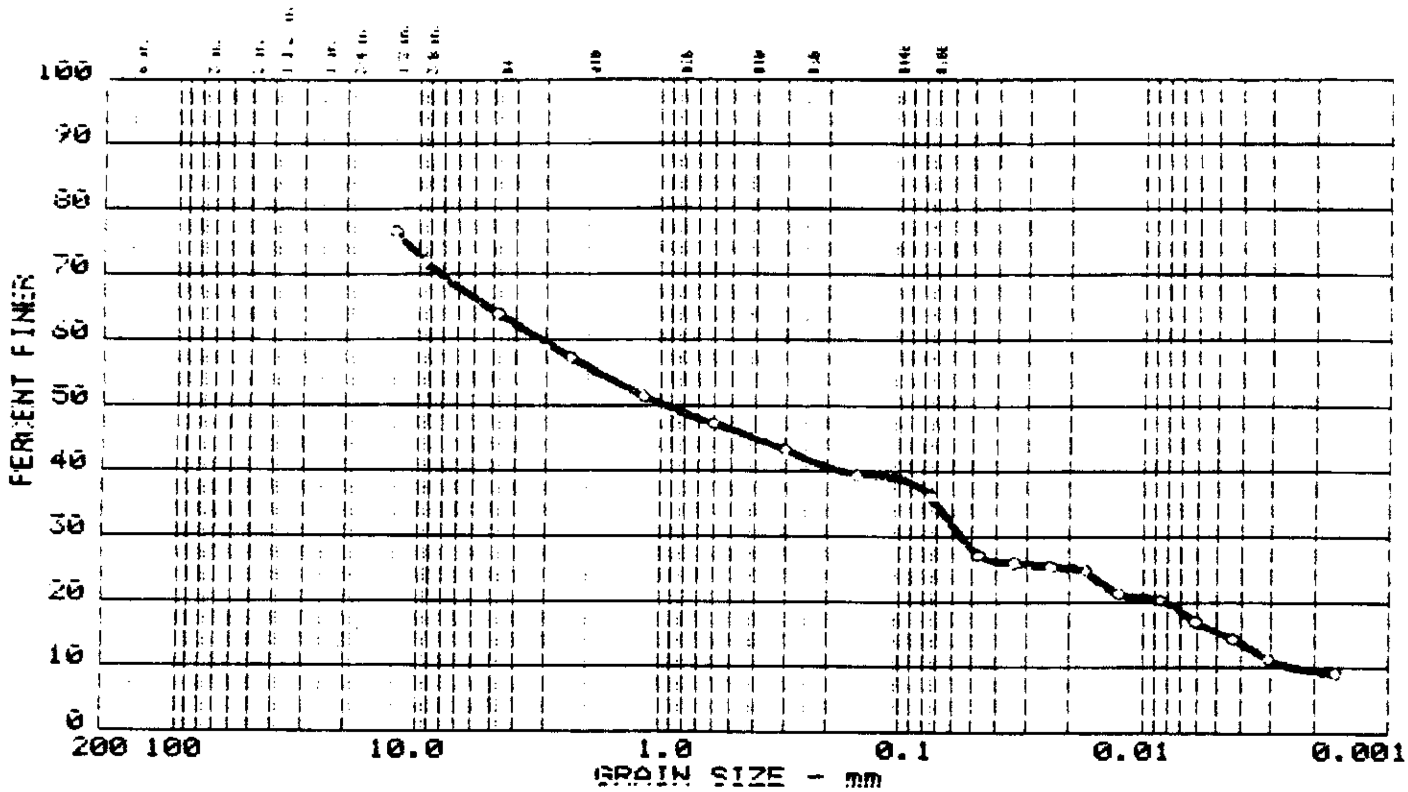
Date: SEPTEMBER 21, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 15	0.0	36.0	27.8	20.7	15.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	26.1	9.6	12.70	3.12	0.93	0.055	0.0046	0.0024	0.40	1273.5

	MATERIAL DESCRIPTION	USCS	AASHTO
○	SANDY SILTY CLAY AND LIMESTONE GRAVEL.	GC	A-4(.)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-22 SAMPLE NO.3 & 5

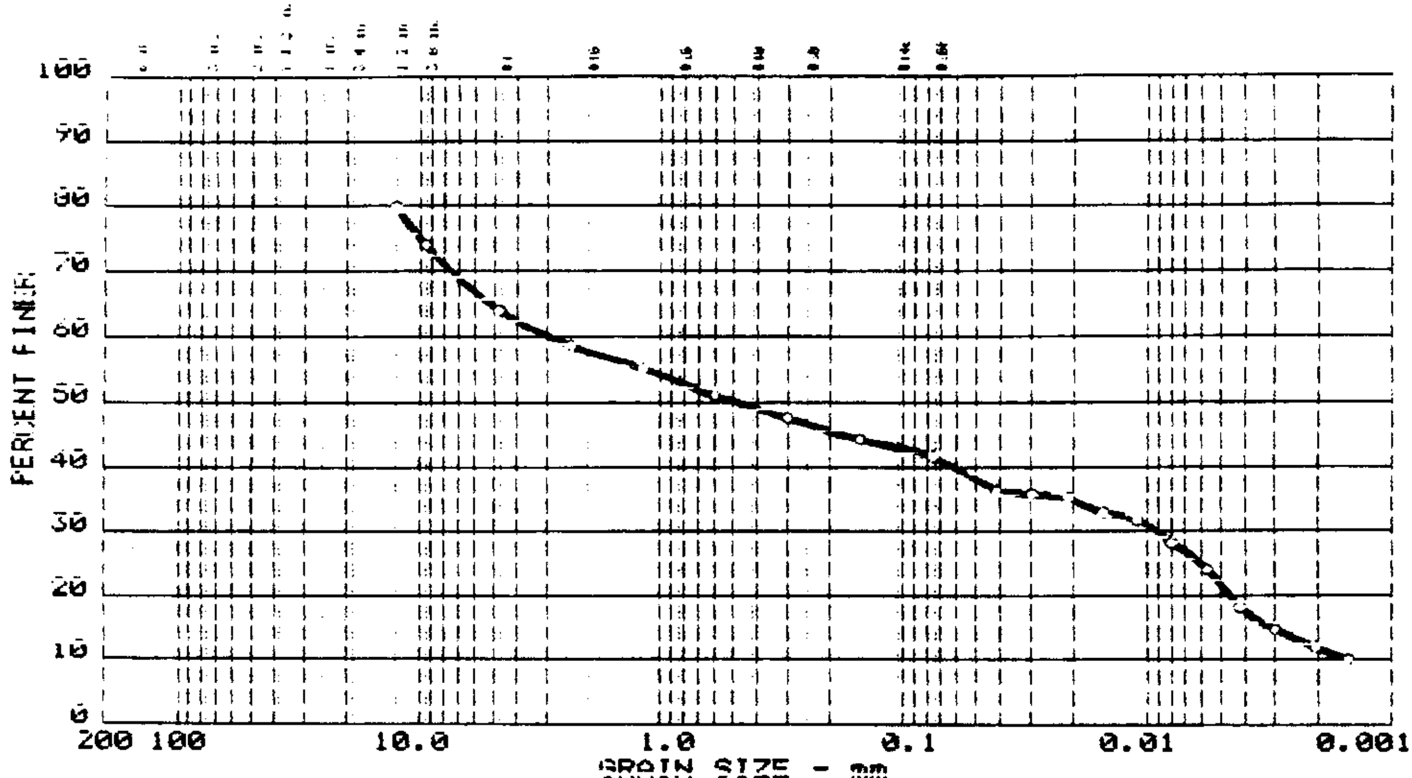
Date: SEPTEMBER 20, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 16	0.0	35.9	22.2	20.3	21.6

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○ 24.2	9.5	12.70	2.91	0.47	0.009	0.0031			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT/CLAY SOME SAND AND LIMESTONE GRAVEL.	GC	A-4(1)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-22 SAMPLE NO. 7 & 8

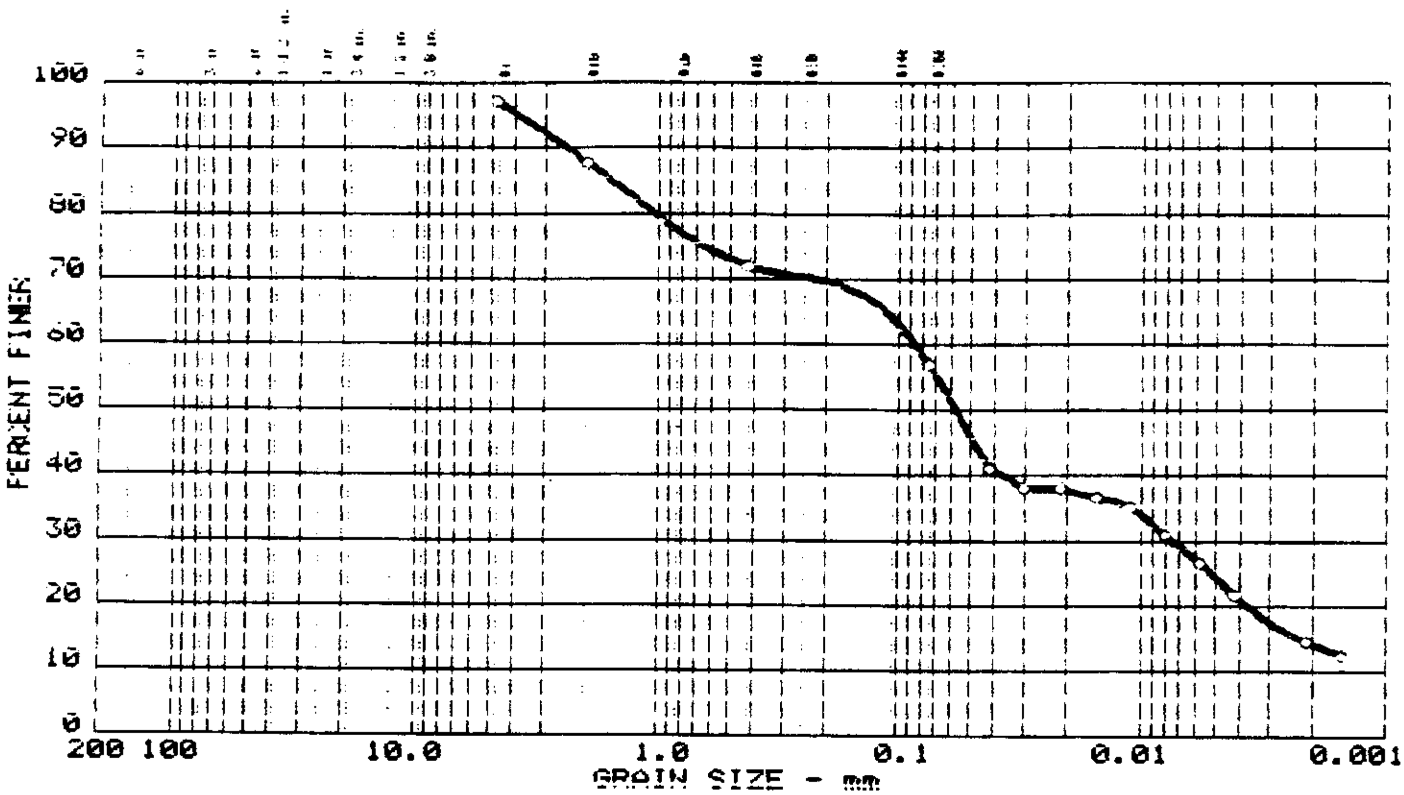
Date: SEPTEMBER 20, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
17	0.0	2.9	40.2	32.4	24.5

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
23.6	8.7	1.567	0.085	0.057	0.007	0.0023			

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SILT AND SAND, TRACE LIMESTONE GRAVEL.	CL	A-4(9)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-22 SAMPLE NO. 11 & 13

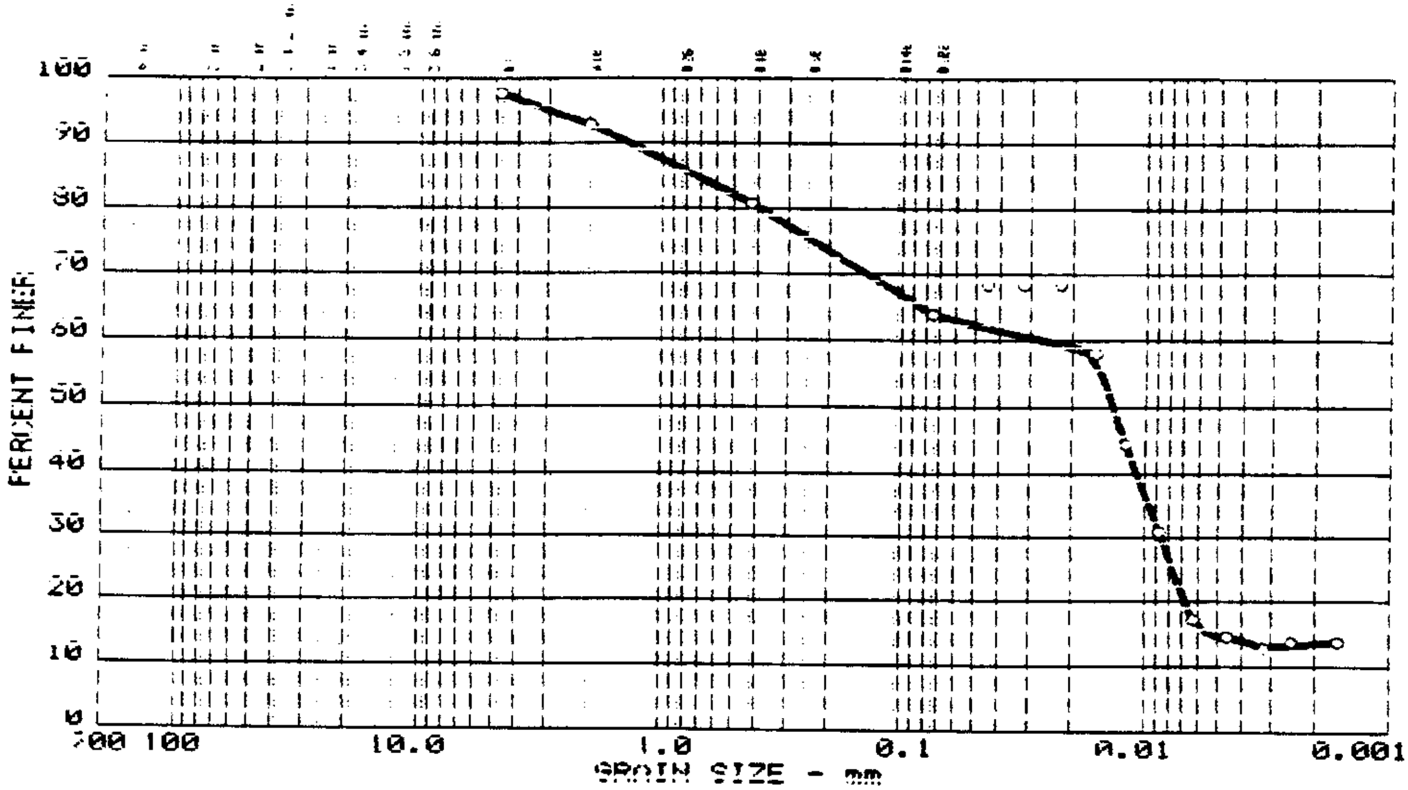
Date: SEPTEMBER 20, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
18	0.0	2.3	35.8	47.2	14.7

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
25.5	9.9	0.724		0.014	0.009	0.0054			

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SILT AND SAND, TRACE LIMESTONE GRAVEL.	CL	A-4(3)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-22 SAMPLE NO. 15

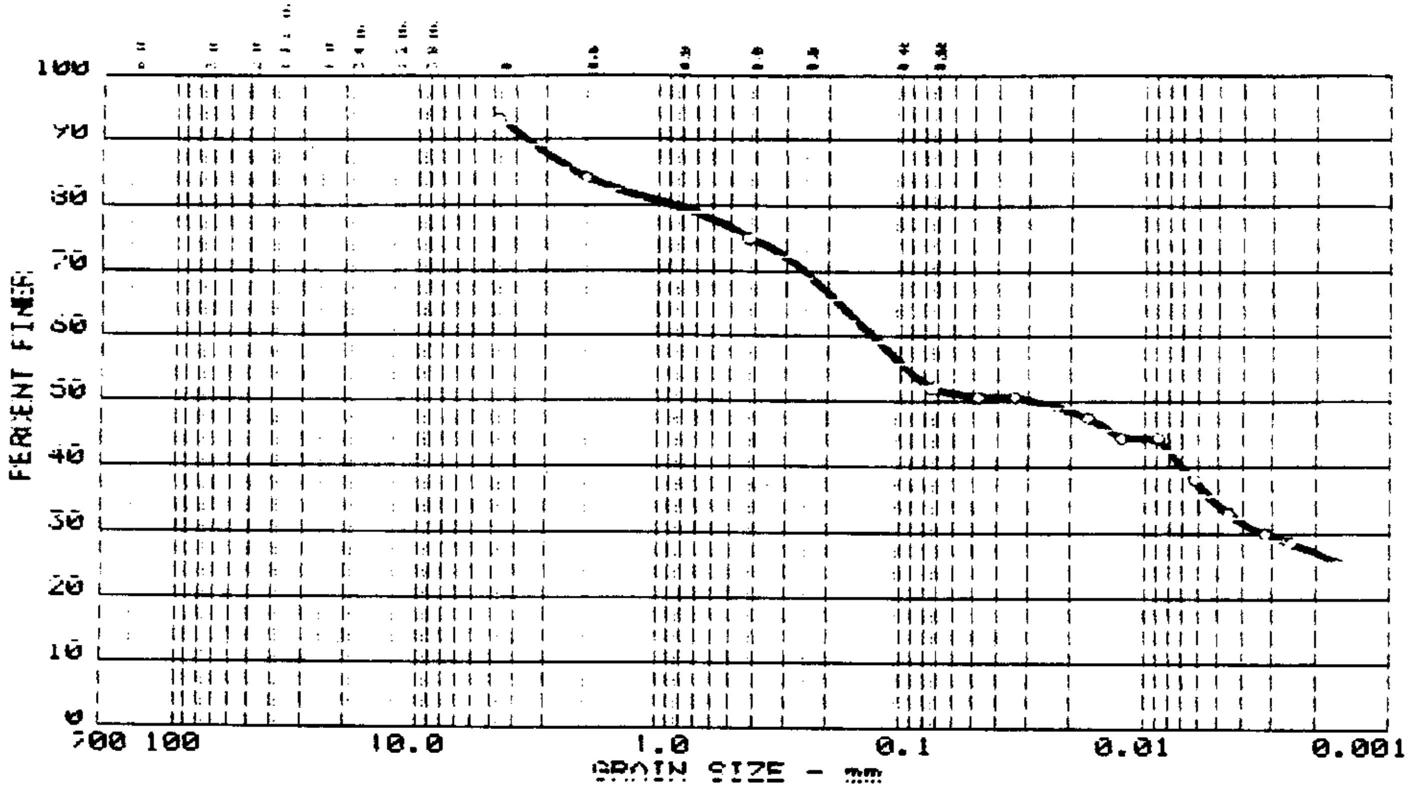
Date: SEPTEMBER 20, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	0.0	6.8	41.2	17.6	34.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.163	0.130	0.027	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAYEY SAND, TRACE GRAVEL.		

Project no.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-22 SAMPLE NO. 28

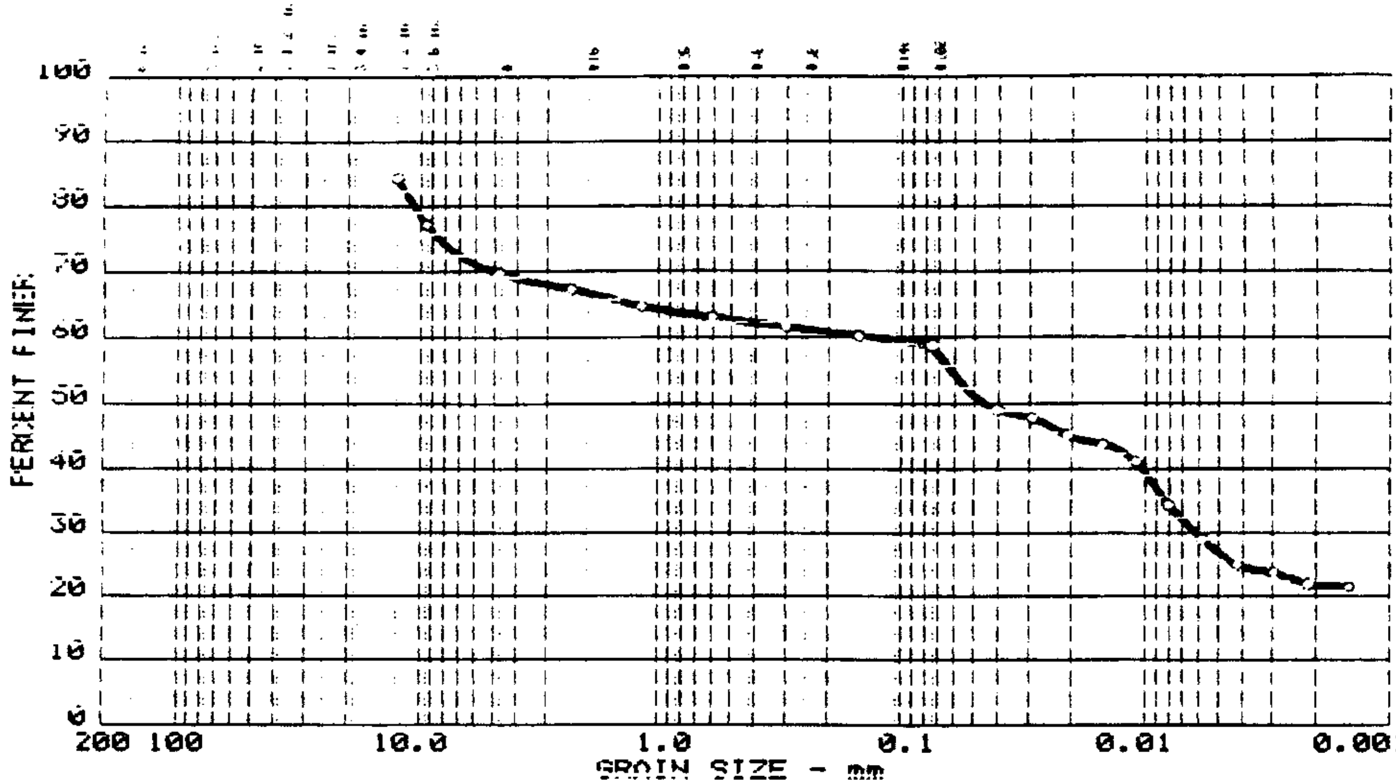
Date: SEPTEMBER 20, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 20	0.0	30.3	10.9	31.9	26.9

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
27.40	11.1	12.700	0.130	0.045	0.006				

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SILT AND LIMESTONE GRAVEL, TRACE SAND.	CL	A-6(4)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-23 SAMPLE NO. 3

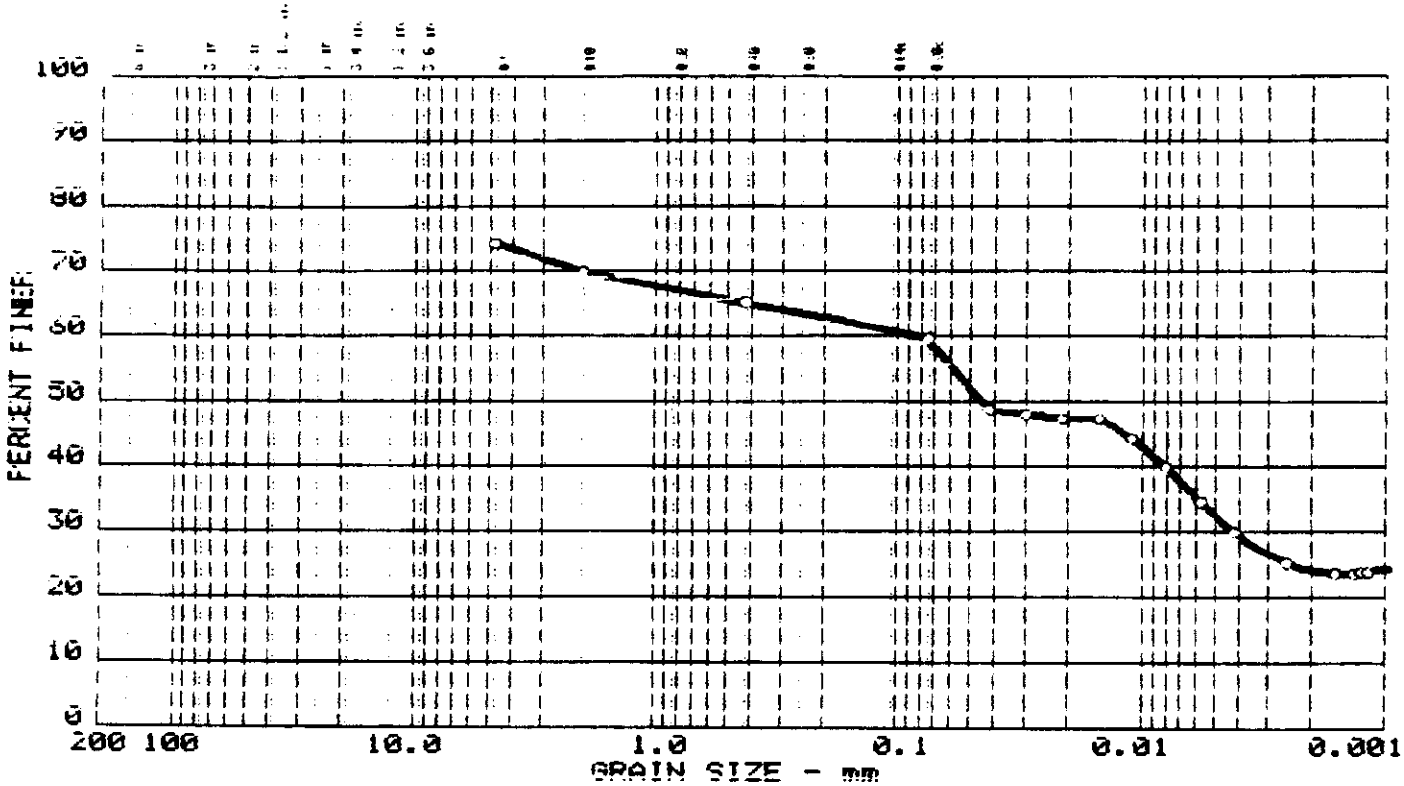
Date: SEPTEMBER 20, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	0.0	25.7	14.6	27.3	32.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	53.52	36.7	4.750	0.082	0.045	0.004				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY , LIMESTONE GRAVEL, SOME SAND.	CH	A-7-6(19)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-23 SAMPLE NO. 9

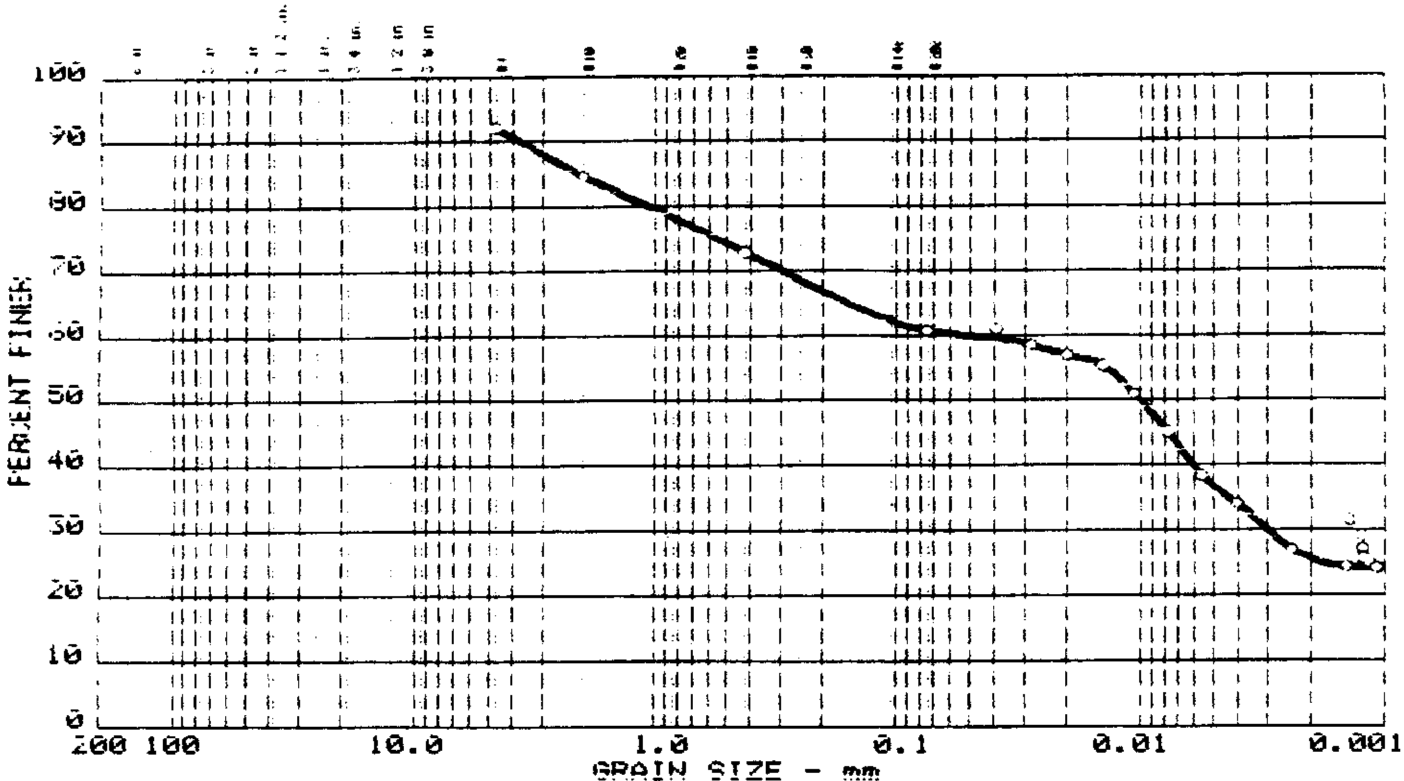
Date: SEPTEMBER 20, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 2	0.0	7.9	31.2	24.3	36.6

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
32.7	16.74	2.065		0.010	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY SILTY CLAY, TRACE LIMESTONE GRAVEL.	CL	A-6(7)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-23 SAMPLE NO. 11

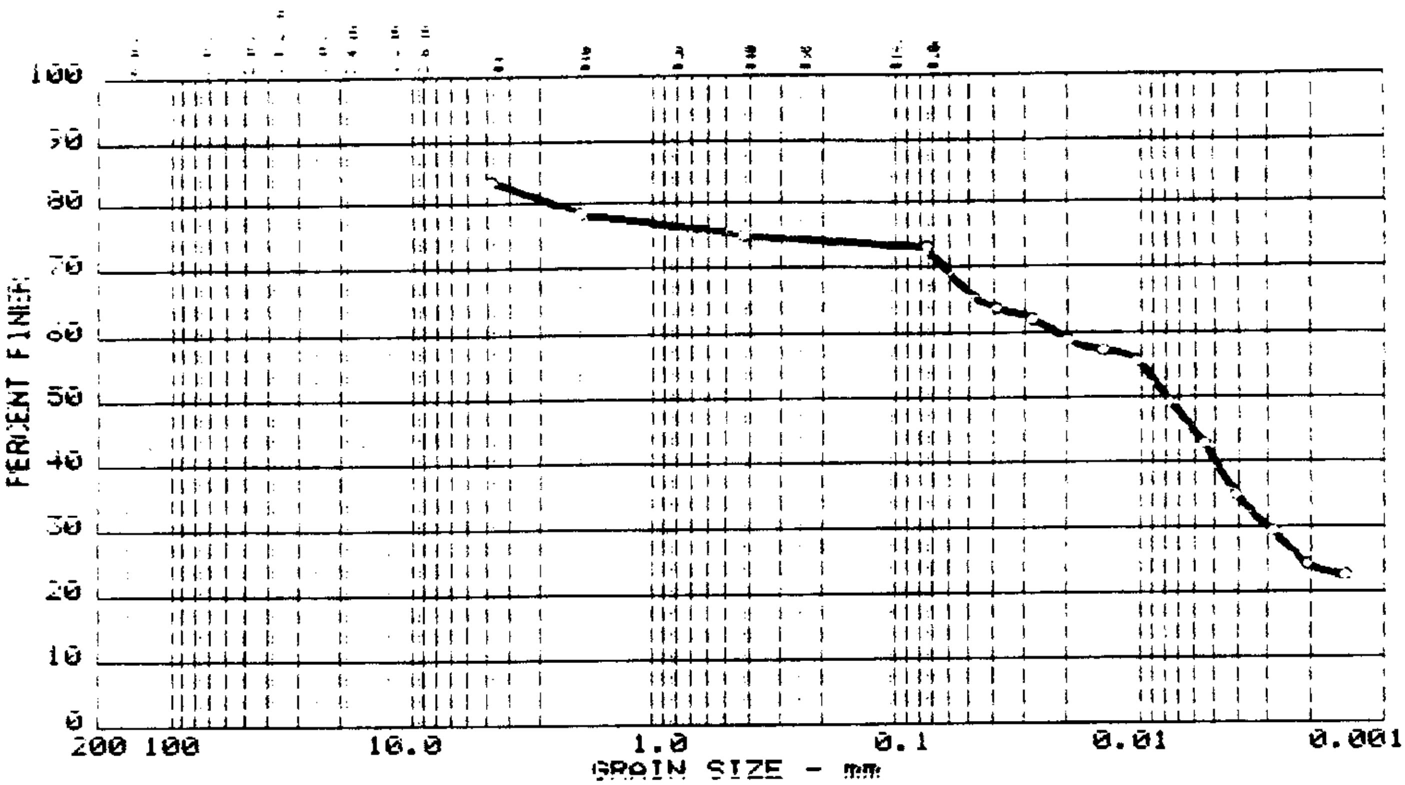
Date: SETEMBER 20, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 3	0.0	16.6	10.3	33.0	40.1

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	42.2	23.8	4.750		0.008	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, SOME LIMESTONE GRAVEL, TRACE SAND.	CL	A-7-6(16)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-23 SAMPLE NO. 13

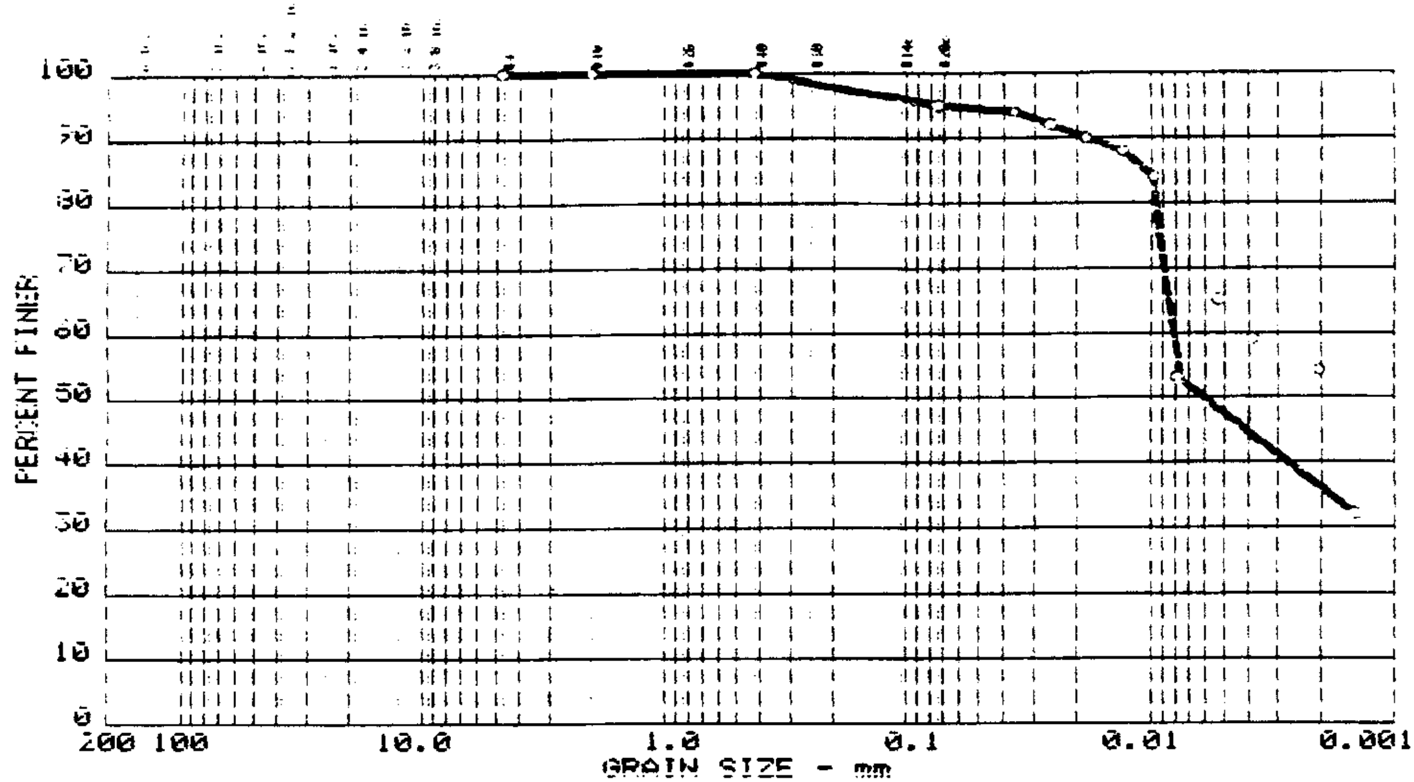
Date: SEPTEMBER 20, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
4	0.0	0.0	4.9	47.6	47.5

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
77.6	52.6			0.006					

MATERIAL DESCRIPTION	USCS	AASHTO
SILT AND CLAY, TRACE SAND.	CH	A-7-6(66)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-23 SAMPLE NO. 14

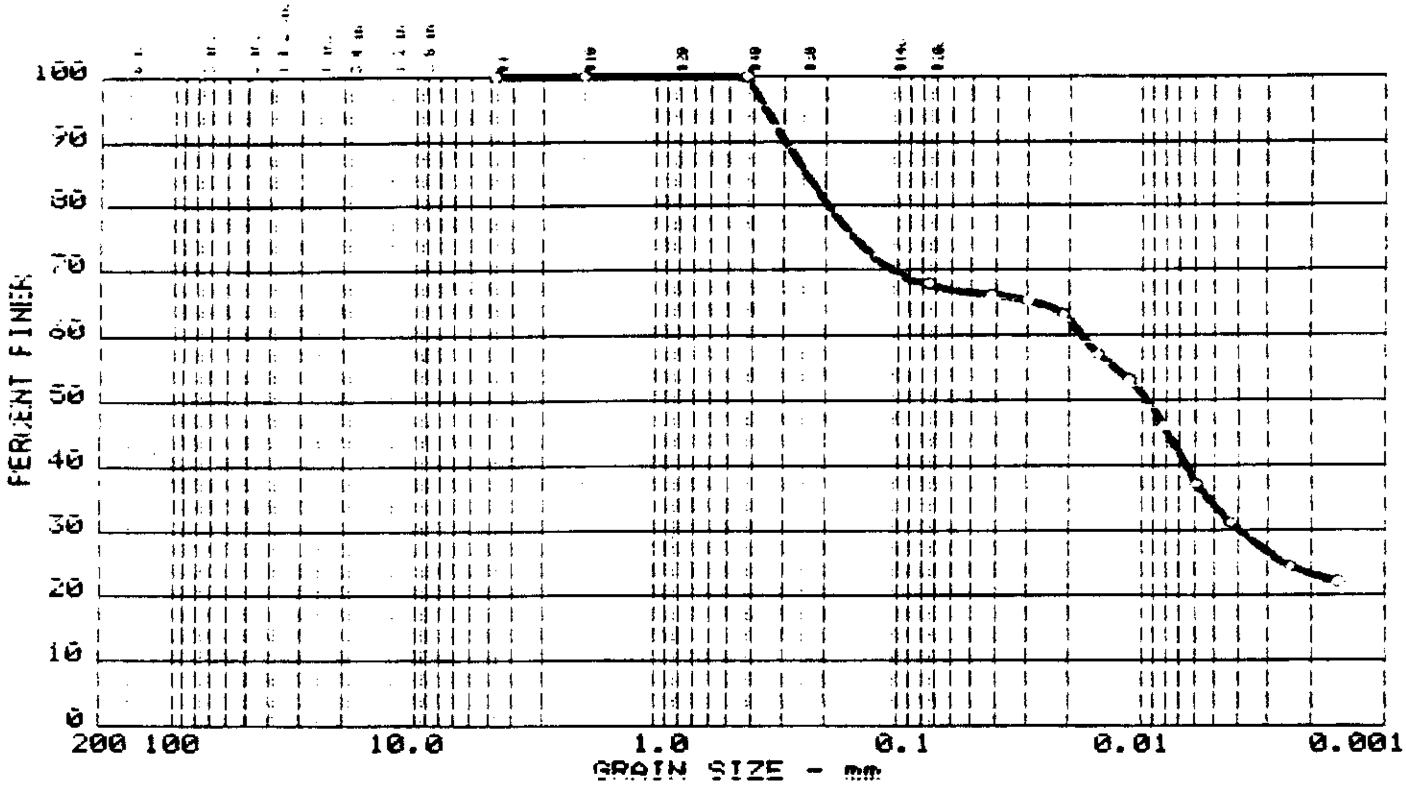
Date: SEPTEMBER 20, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 5	0.0	0.0	32.0	34.3	33.7

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	25.1	7	0.240		0.009	0.004				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY SILTY CLAY.	CL	A-4(2)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-23 SAMPLE NO. 16

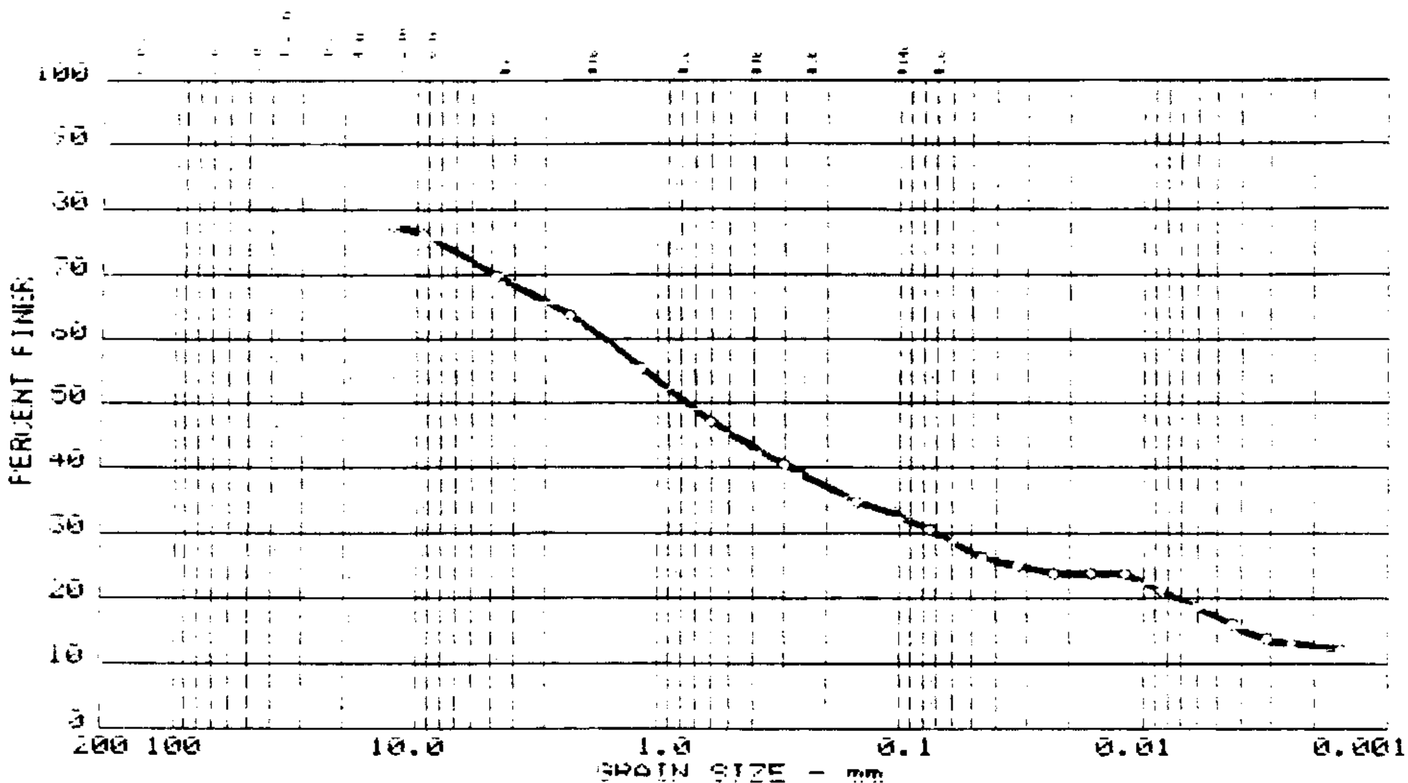
Date: SEPTEMBER 20, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.6

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
o	0.0	30.1	37.2	15.5	17.2

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
20.1	5.5	12.78	1.66	0.76	0.069	0.0038			

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND AND LIMESTONE GRAVEL, SOME SILT,SOME CLAY.	SC-SM	A-2-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
o Location: BORING PD-23 SAMPLE NO. 19 & 20

Date: SEPTEMBER 20, 1994

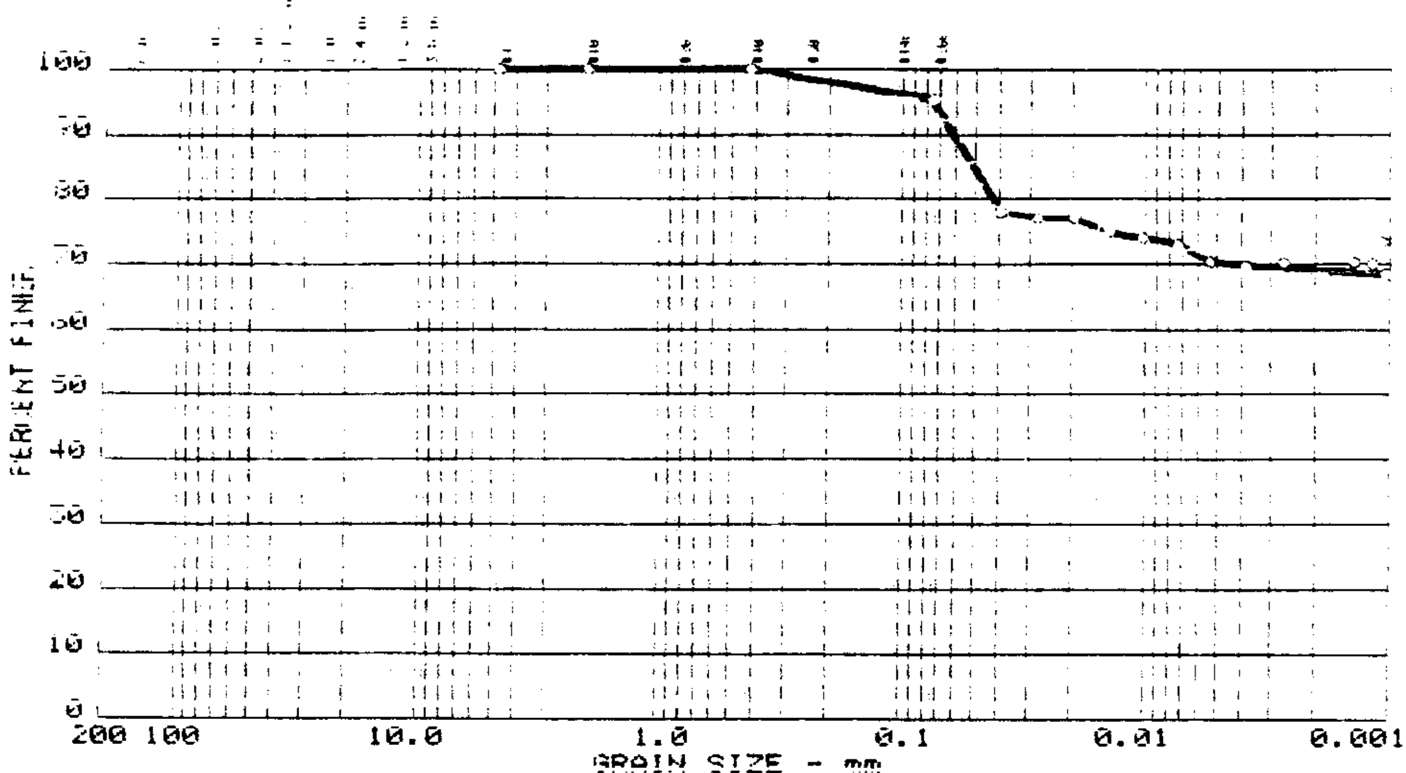
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.7

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
7	0.0	0.0	4.7	25.0	70.3

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
88.35	53								

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAY, TRACE SAND.	CH	A-7-6(58)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-24 SAMPLE NO. 5

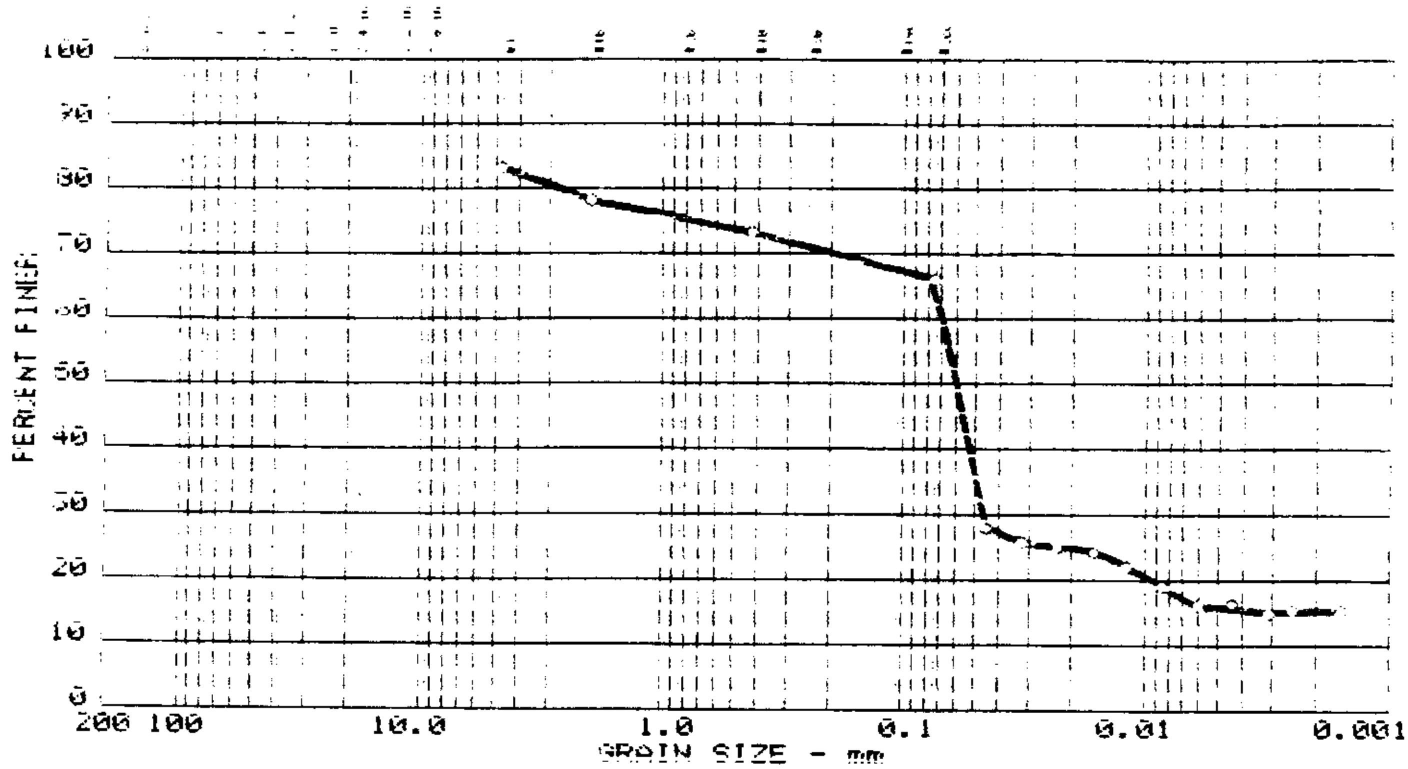
Date: SEPTEMBER 21, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
6	0.0	16.6	17.1	50.2	15.9

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
49.7	31.5	4.750		0.060	0.046				

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SILT, SOME LIMESTONE GRAVEL, SOME SAND.	CL	A-7-6(19)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-24 SAMPLE NO. 11

Date: SEPTEMBER 21, 1994

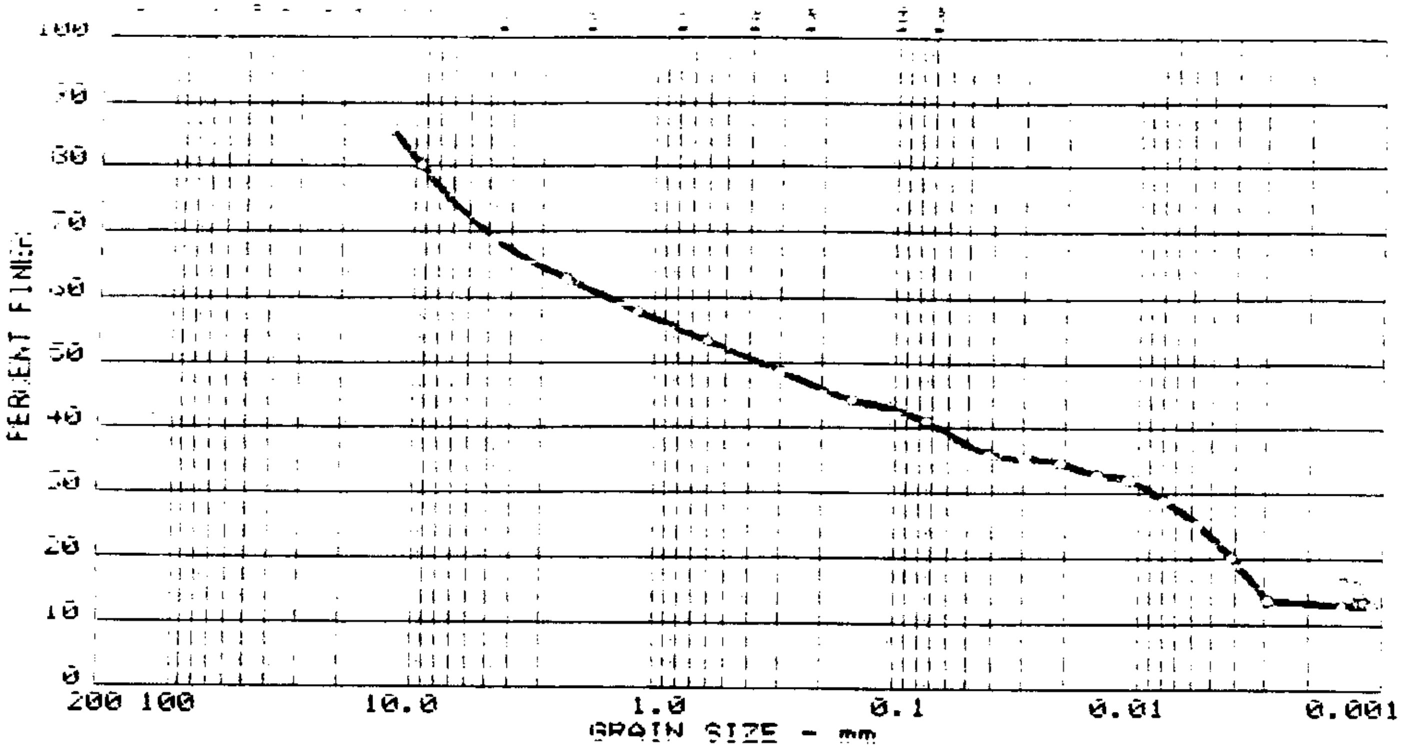
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
5	0.0	30.7	28.1	17.8	23.4

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
23.1	7	12.02	1.58	0.35	0.009	0.0031			

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAYEY LIMESTON GRAVEL AND SAND.	GC	A-4(1)

Project No.. DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-24 SAMPLE NO. 15

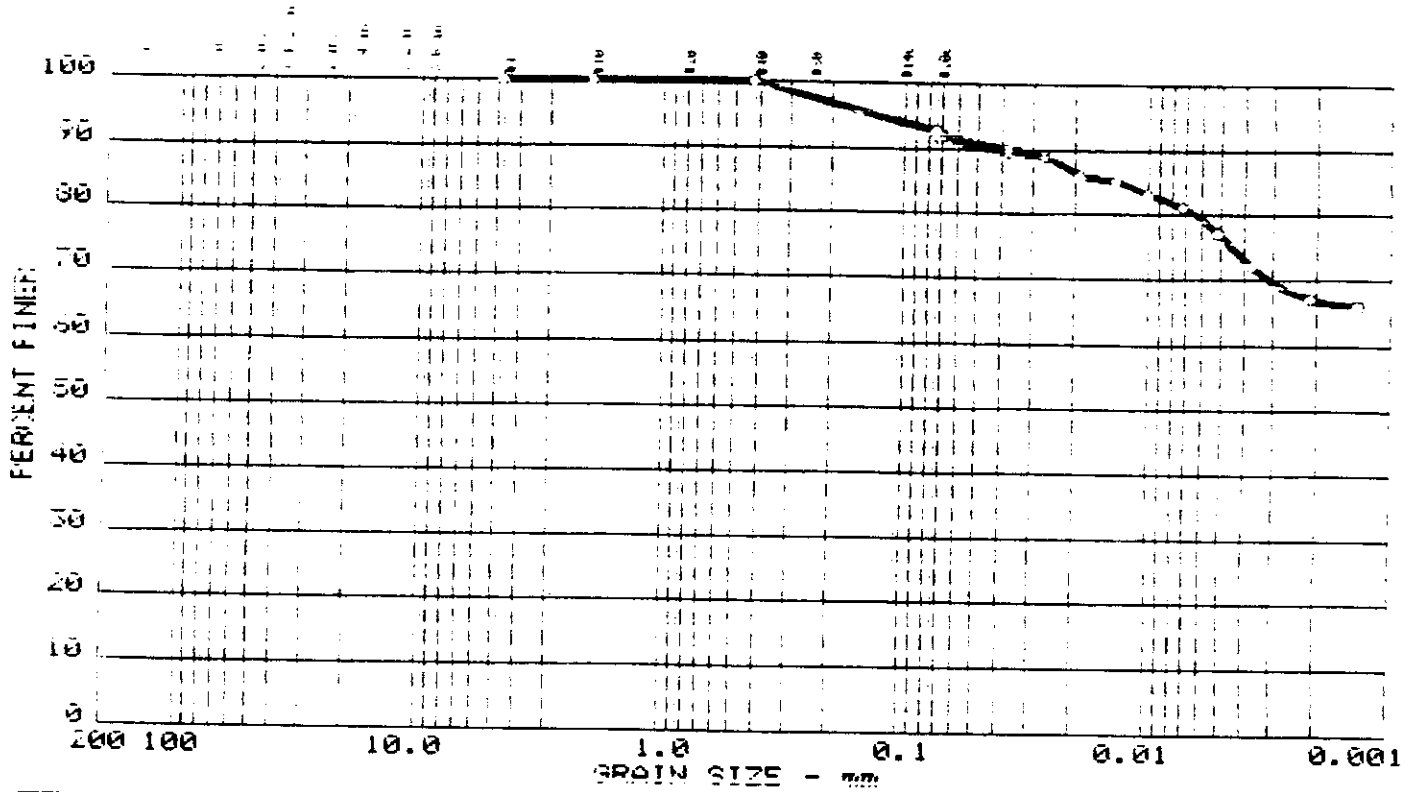
Date: SEPTEMBER 21, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
11	0.0	0.0	7.2	16.1	76.7

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
70.4	49								

MATERIAL DESCRIPTION	USCS	AASHTO
CLAY, SOME SILT, TRACE SAND.	CH	A-7-6(50)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE, PHASE I
Location: BORING PD-24 SAMPLE NO. 20

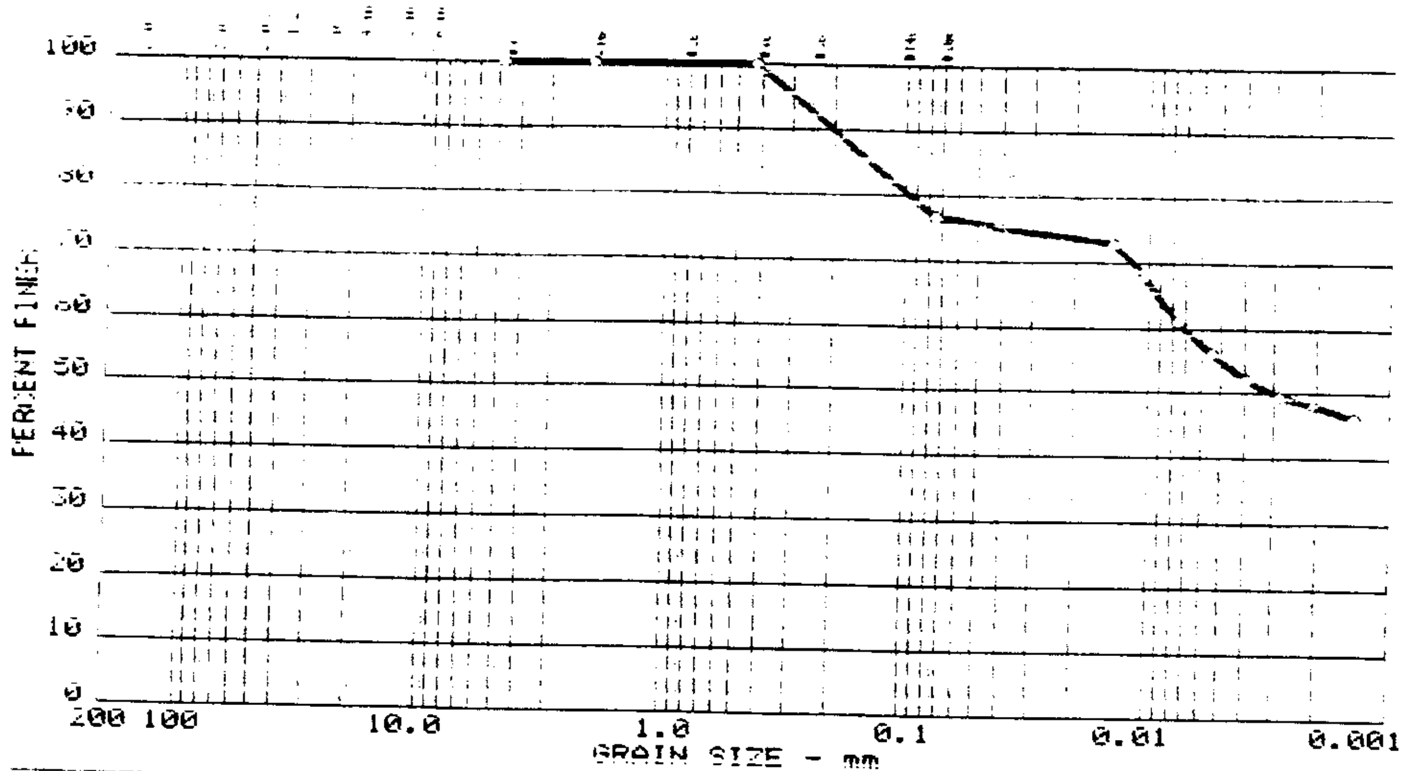
Date: SEPTEMBER 22, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
13	0.0	0.0	23.3	21.8	54.9

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
63.1	42.8	0.138		0.003					

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAY, SOME SAND.	CH	A-7-6(33)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-24 SAMPLE NO. 26

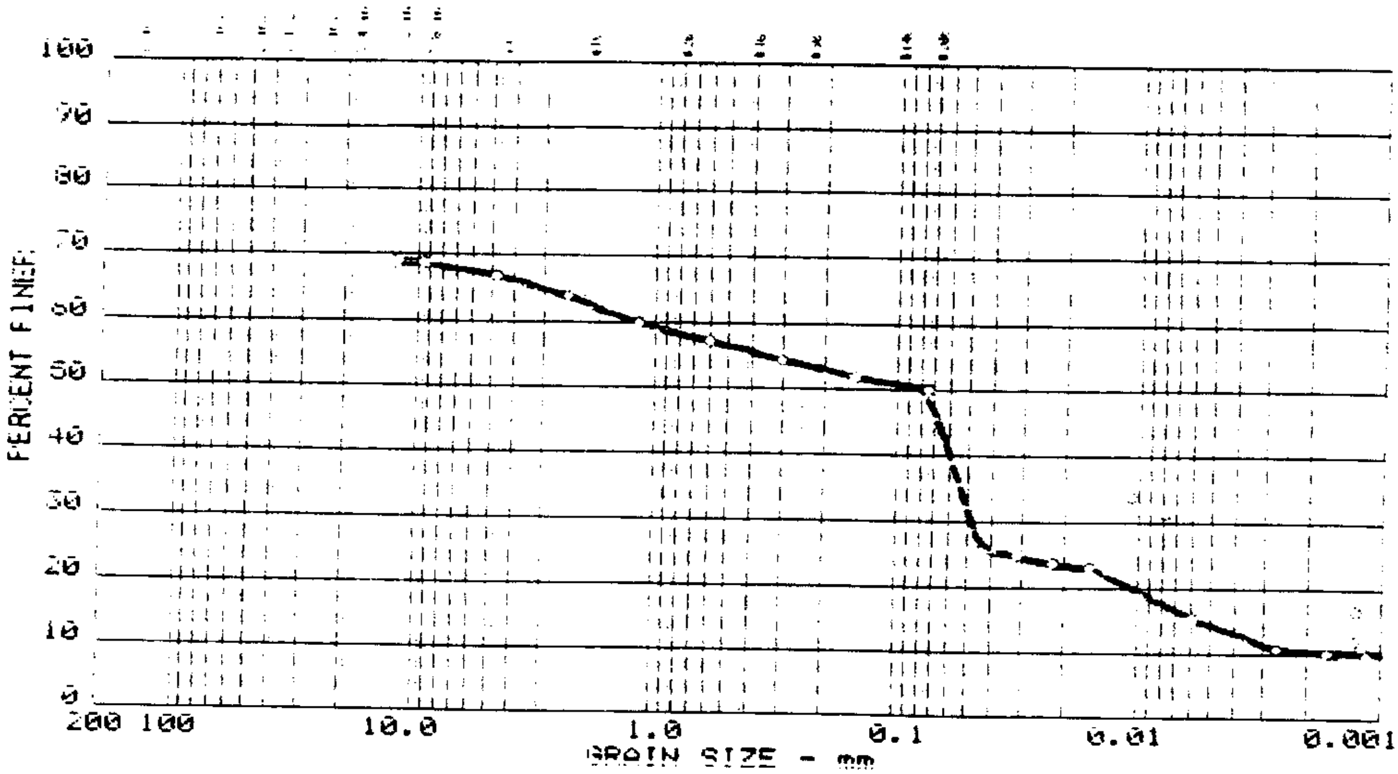
Date: SEPTEMBER 22, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
14	0.0	33.1	16.8	35.7	14.4

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
23.1	7.7	12.700	1.172	0.075	0.048	0.0055	0.0016	1.22	716.1

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SILT AND LIMESTONE GRAVEL, SOME SAND.	CL	A-4(1)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-25 SAMPLE NO. 7

Date: SEPTEMBER 22,1994

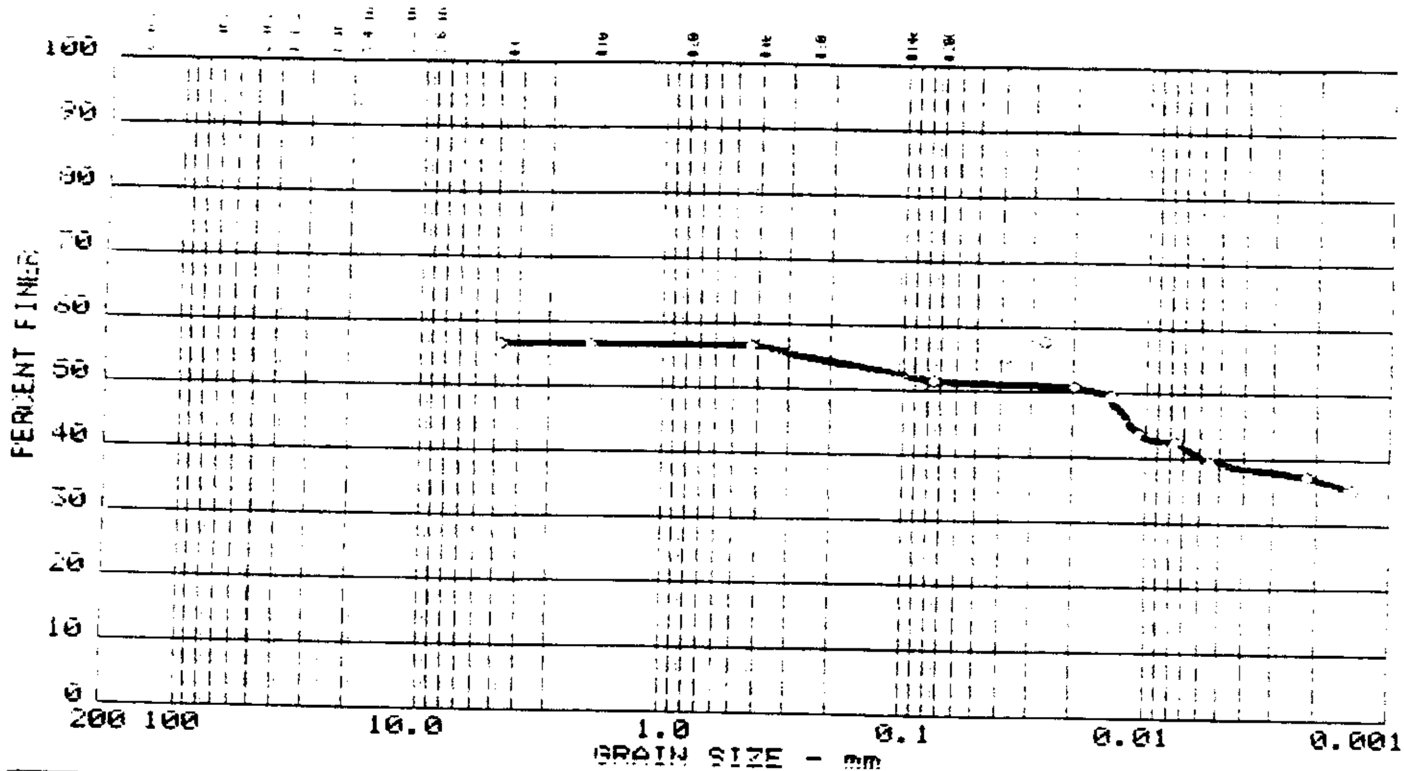
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
15	0.0	43.4	5.1	12.3	39.2

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
62	41.8	4.750	4.750	0.016					

MATERIAL DESCRIPTION	USCS	AASHTO
CLAY AND LIMESTONE GRAVEL, SOME SAND, TRACE SILT.	CH	A-7-6(17)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-25 SAMPLE NO. 6

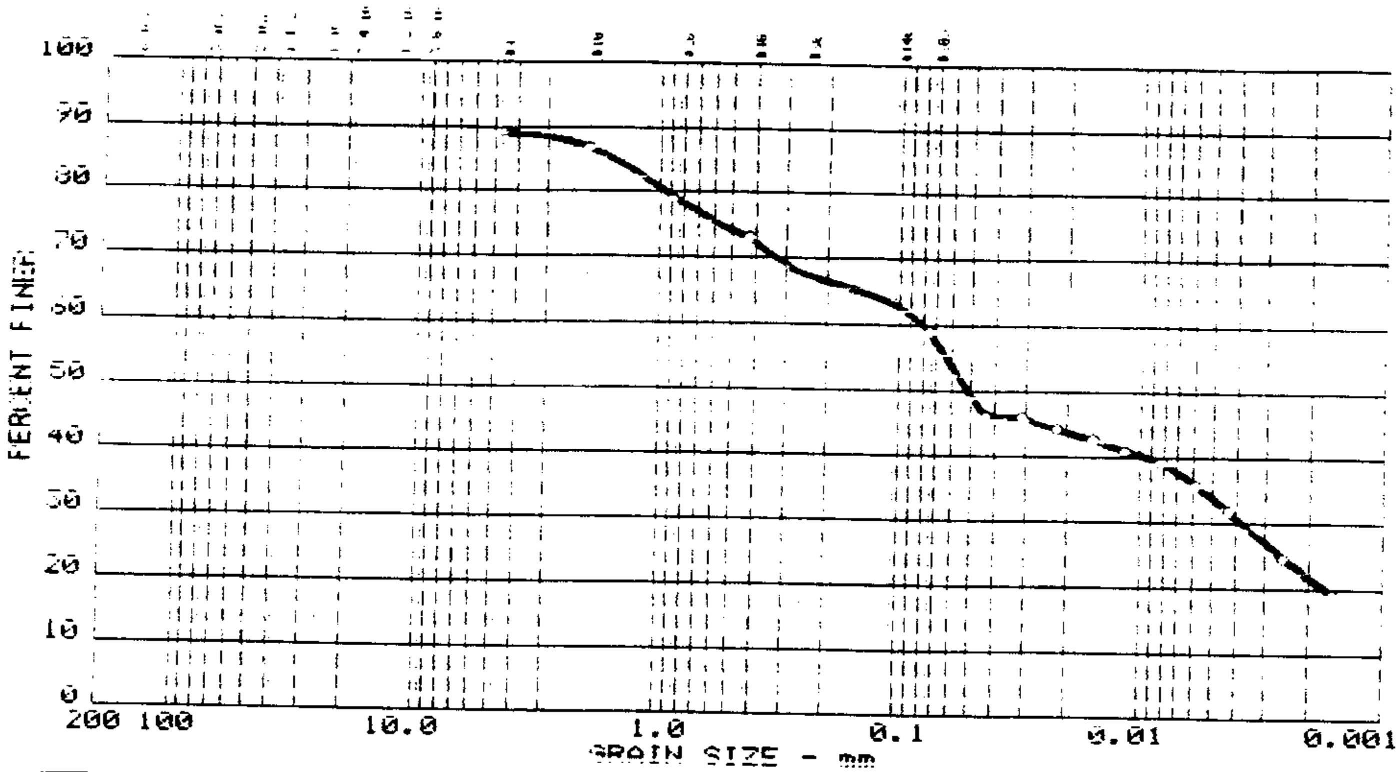
Date: SEPTEMBER 22, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
16	0.0	10.6	30.3	25.3	33.8

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
24.5	9.7	1.567	0.079	0.051	0.004				

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAY AND SAND, TRACE LIMESTONE GRAVEL.	CL	A-4(3)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-25 SAMPLE NO. 10

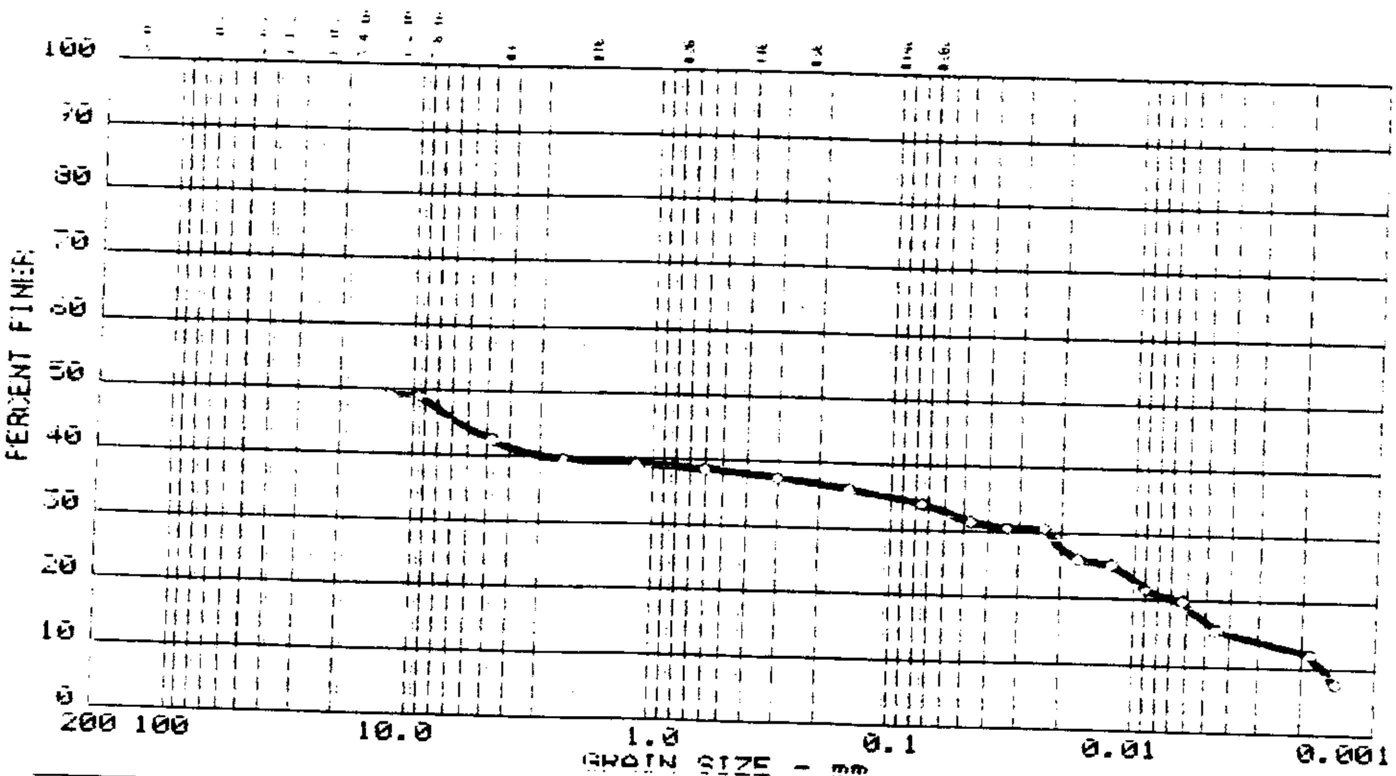
Date: SEPTEMBER 22, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
16	0.0	57.4	8.3	17.5	16.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
		12.70	12.70	12.70	0.023	0.0038	0.0016	0.02	7762.6

MATERIAL DESCRIPTION	USCS	AASHTO
LIMESTONE GRAVEL, TRACE SAND, SOME SILT, SOME CLAY		

Project No.: OSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-25 SAMPLE NO. 19

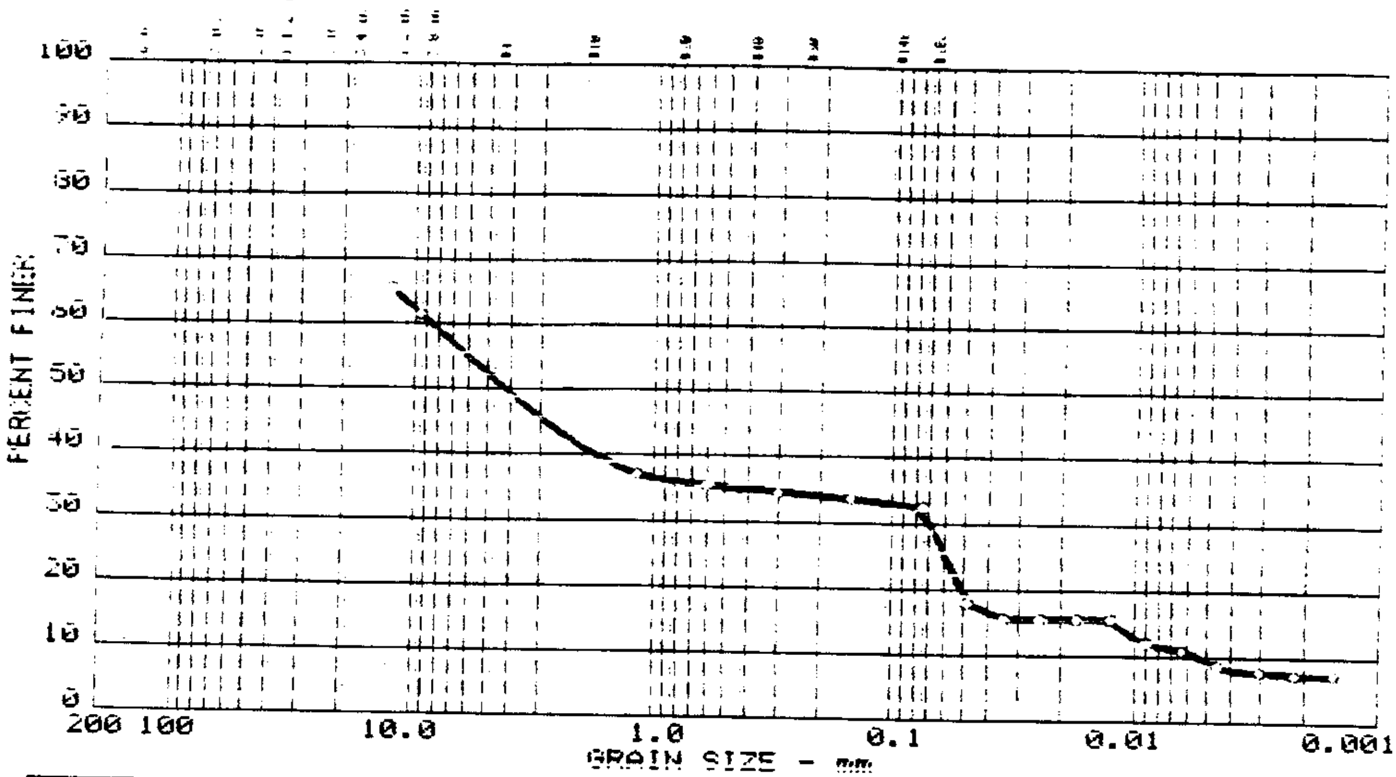
Date: SEPTEMBER 22, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
17	0.0	48.3	19.2	23.2	9.3

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
		12.70	8.49	4.16	0.070	0.0119	0.0055	0.10	1554.2

MATERIAL DESCRIPTION	USCS	AASHTO
LIMESTONE GRAVEL, SOME SILTY SAND, TRACE CLAY.		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-25 SAMPLE NO. 17

Date: SEPTEMBER 22, 1994

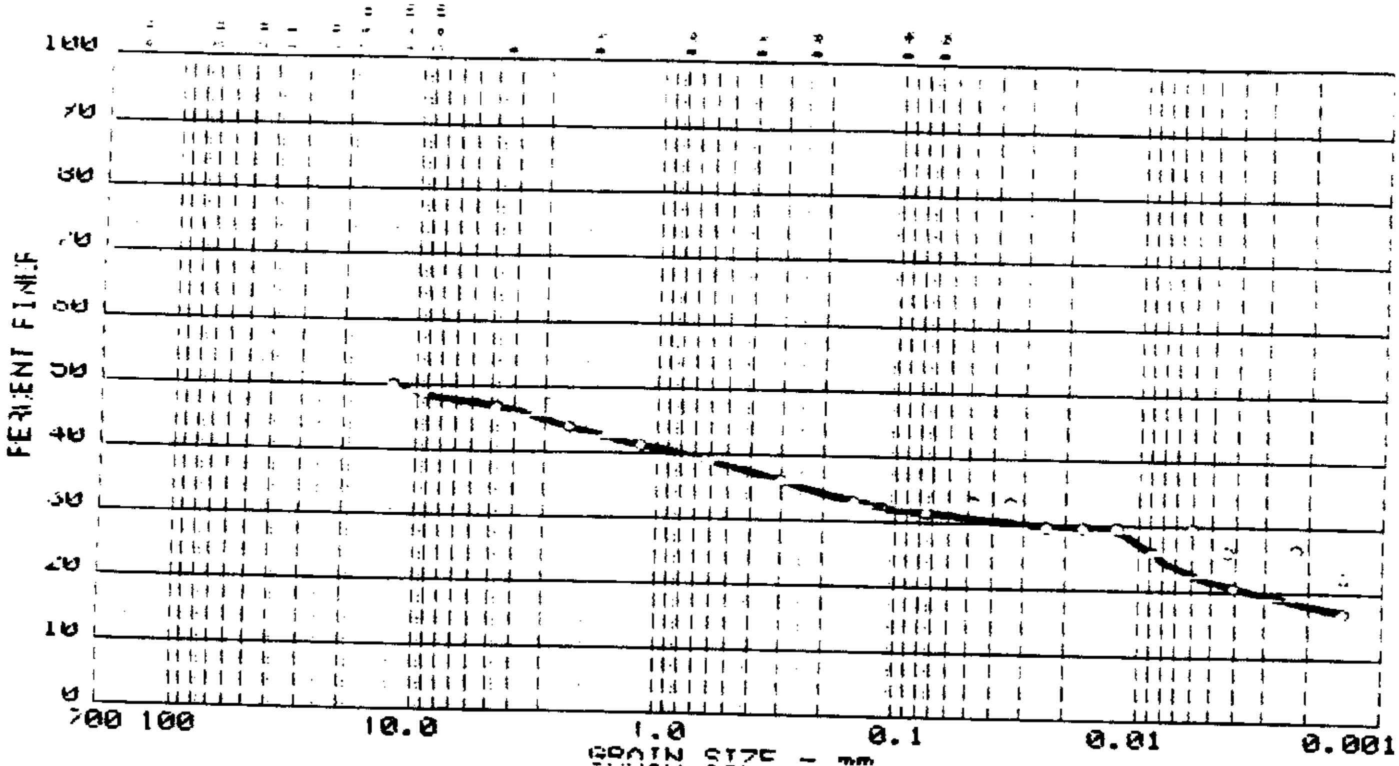
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
26	0.0	53.0	15.4	10.0	21.6

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
12.55	5.3	12.70	12.70	12.55	3.338				

MATERIAL DESCRIPTION	USCS	AASHTO
LIMESTONE GRAVEL, SOME SAND, TRACE SILT, SOME CLAY	GC-GM	A-2-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING FD-26 SAMPLE NO. 16

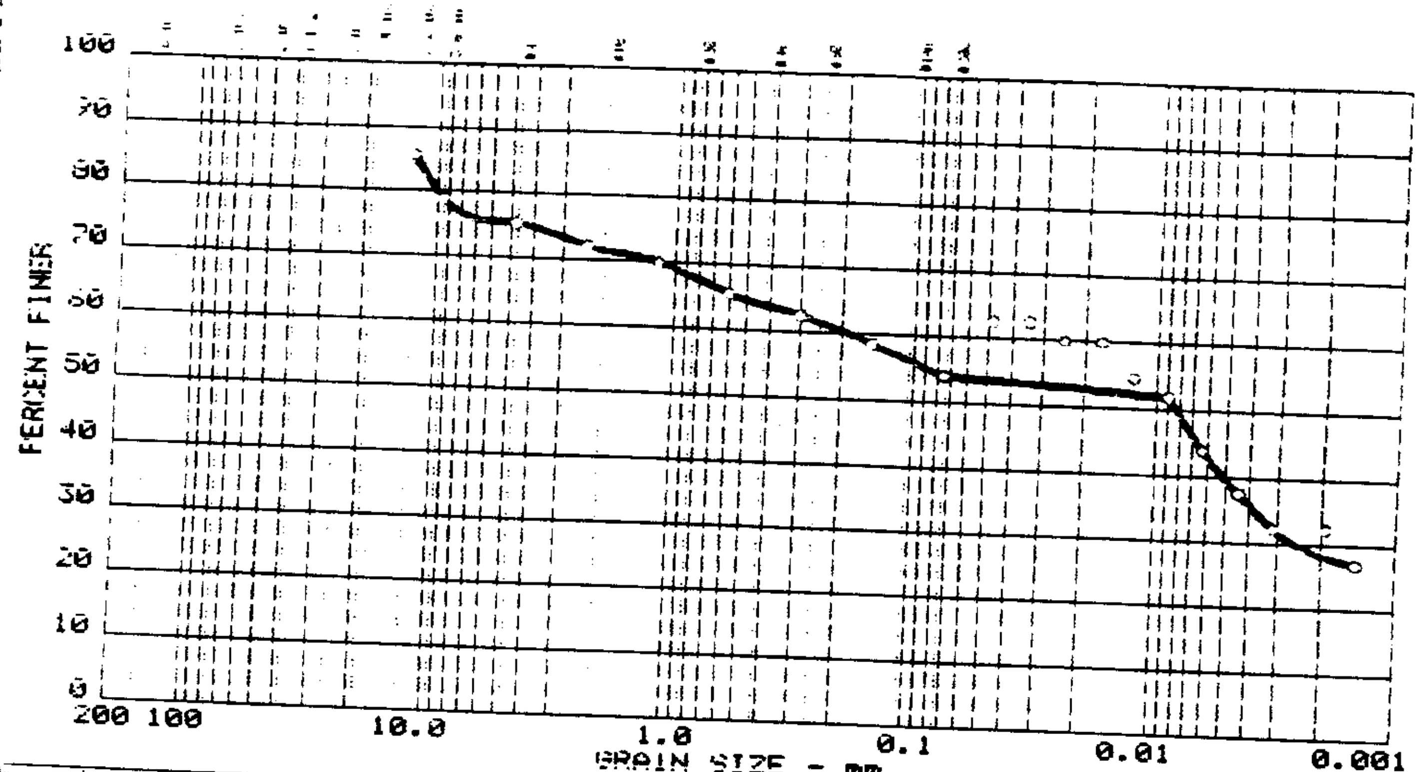
Date: SEPTEMBER 22, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
1	0.0	24.7	21.3	14.5	39.5

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
		12.303	0.184	0.008	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAY, SOME GRAVEL AND LIMESTONE GRAVEL.		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-26 SAMPLE NO. 18

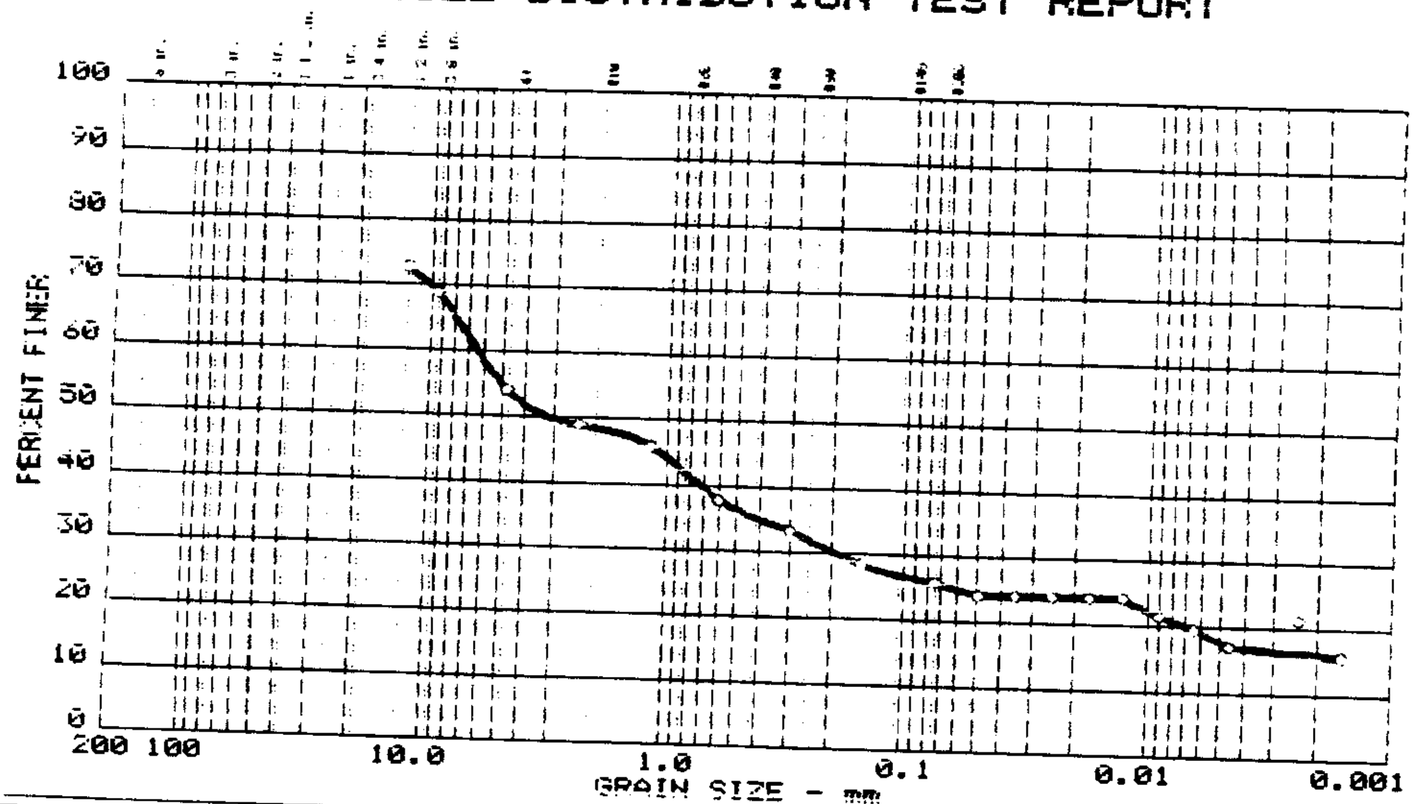
Remarks:

Date: SEPTEMBER 22, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
2	0.0	45.9	28.1	8.3	17.7

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
		12.70	6.29	3.19	0.188				

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY GRAVEL, TRACE SILT, SOME CLAY.		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-26 SAMPLE NO. 26

Date: SEPTEMBER 22, 1994

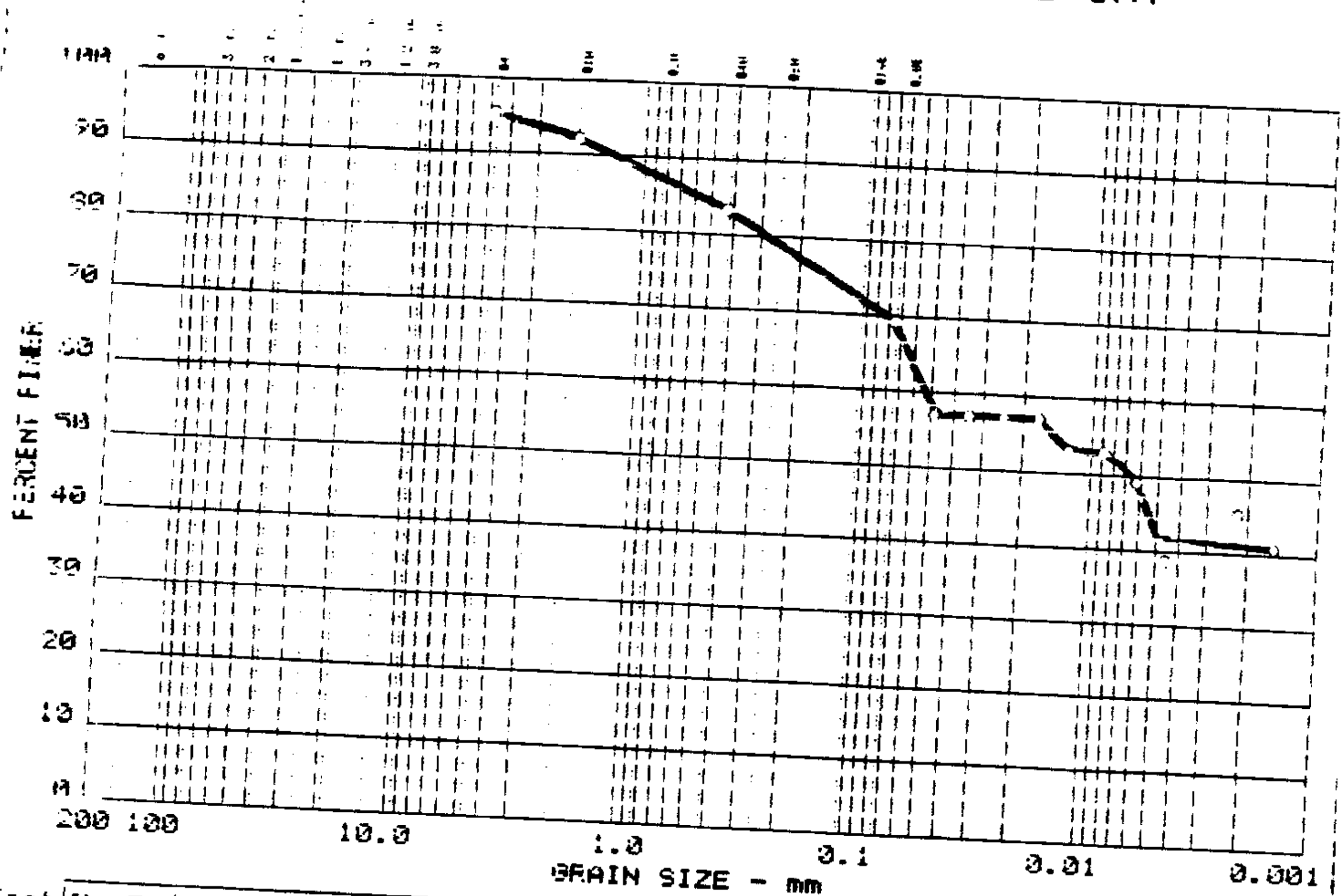
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
3	0.0	4.7	26.0	27.3	42.0

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
		0.562		0.007					

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY SILTY CLAY, TRACE GRAVEL.		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-26 SAMPLE NO. 28

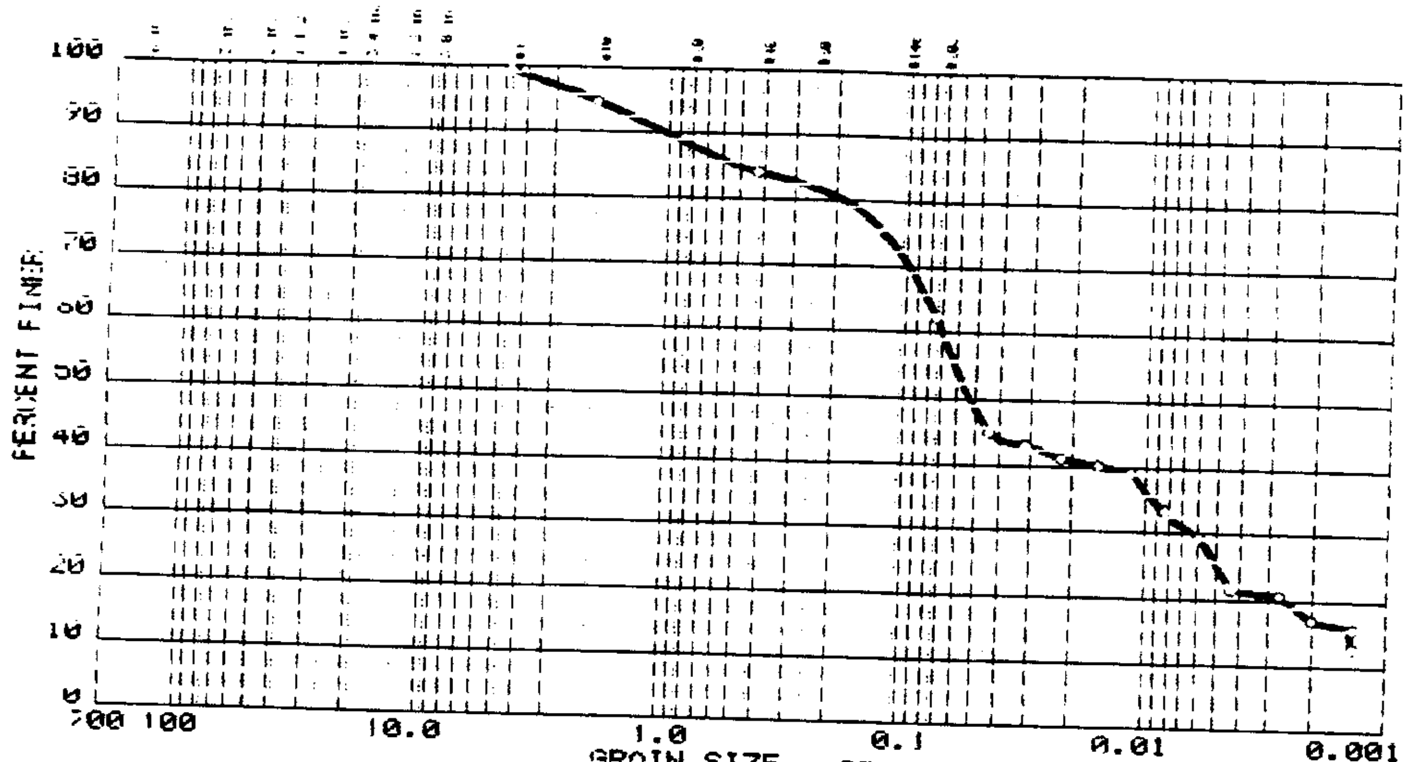
Date: SEPTEMBER 22, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	0.0	0.6	37.1	37.1	25.2

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○			0.475		0.053	0.006				

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SILT AND SAND, TRACE GRAVEL.	CL	A-4(11)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-26 SAMPLE NO. 36

Date: SEPTEMBER 23, 1994

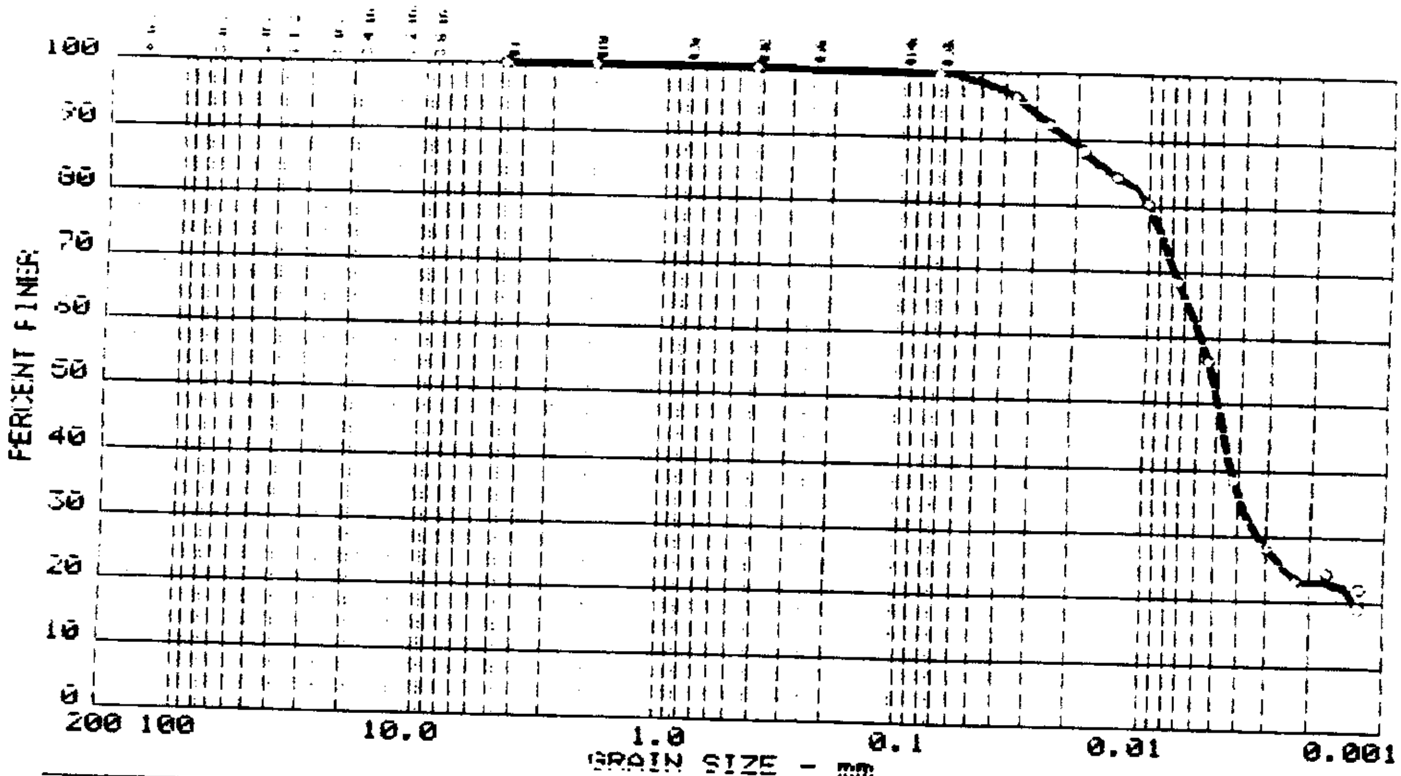
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 6

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	6	0.0	0.0	0.3	49.7	50.0

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	43.7	22.5			0.005	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT AND CLAY.	CL	A-7-6(25)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-27 SAMPLE NO. 3

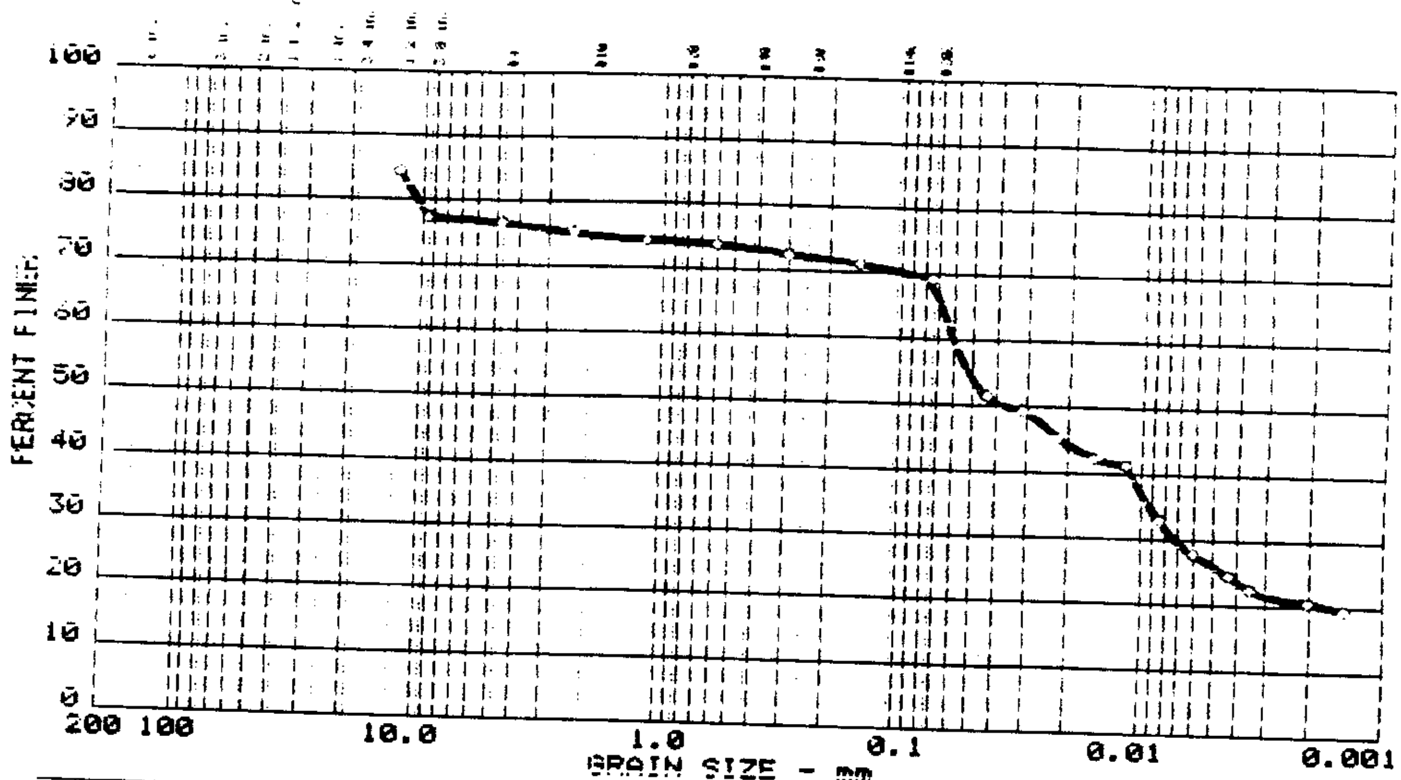
Date: SEPTEMBER 23, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	7	0.0	23.5	7.2	43.1	26.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	30.52	13	12.700		0.037	0.007				

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY CLAYEY SILT, TRACE SAND.	CL	A-6(10)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-27 SAMPLE NO. 9

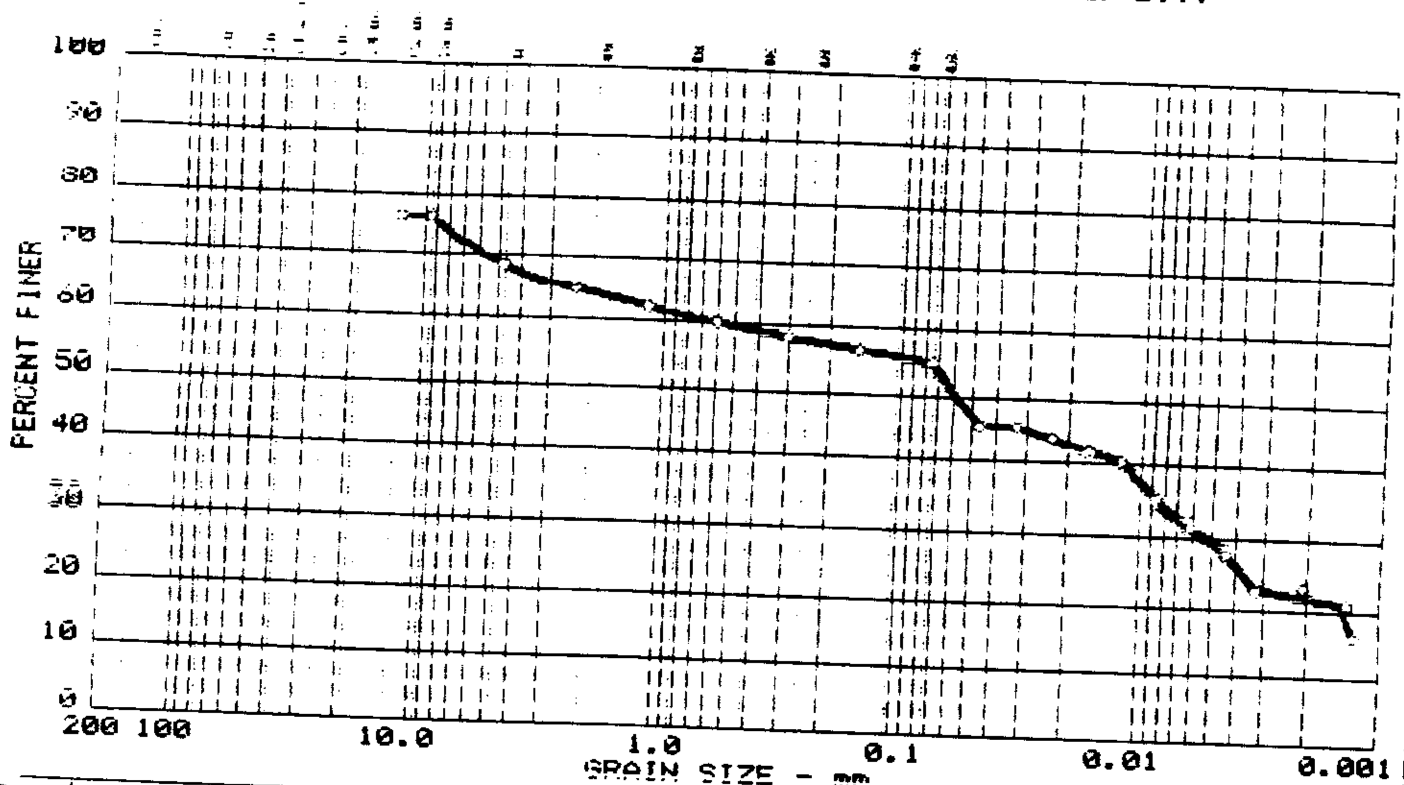
Date: SEPTEMBER 27, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
0	0.0	31.4	13.5	25.3	29.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
29.2	13.2	12.700	0.529	0.058	0.005				

MATERIAL DESCRIPTION	USCS	AASHTO
GRAVELLY SILTY CLAY, SOME SAND.	CL	A-6(8)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-27 SAMPLE NO. 11

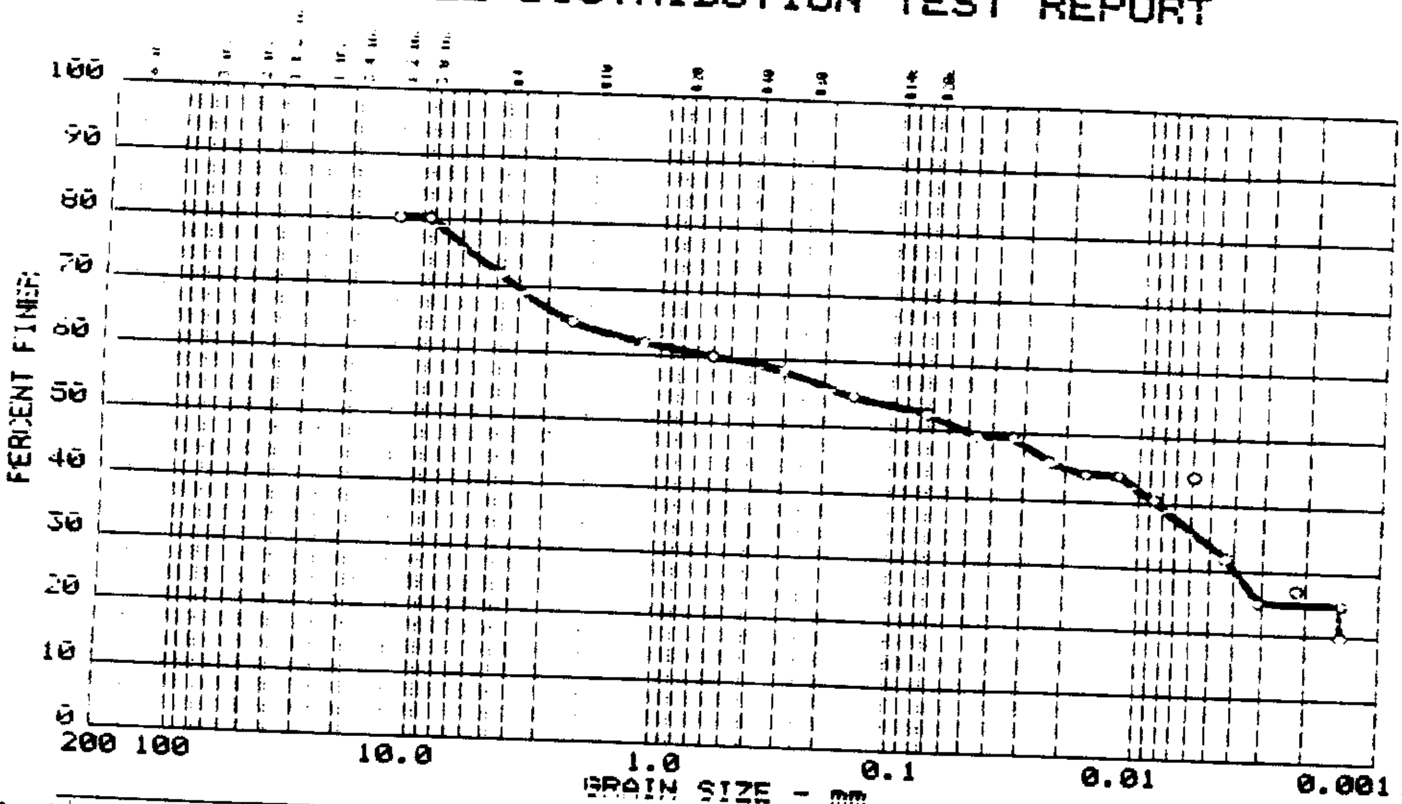
Date: SEPTEMBER 23, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 9	0.0	28.1	19.4	18.5	34.0

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○ 25.48	11	12.700	0.529	0.051	0.004				

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY CLAY, SOME SAND, SOME SILT.	CL	A-6(4)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-27 SAMPLE NO. 13

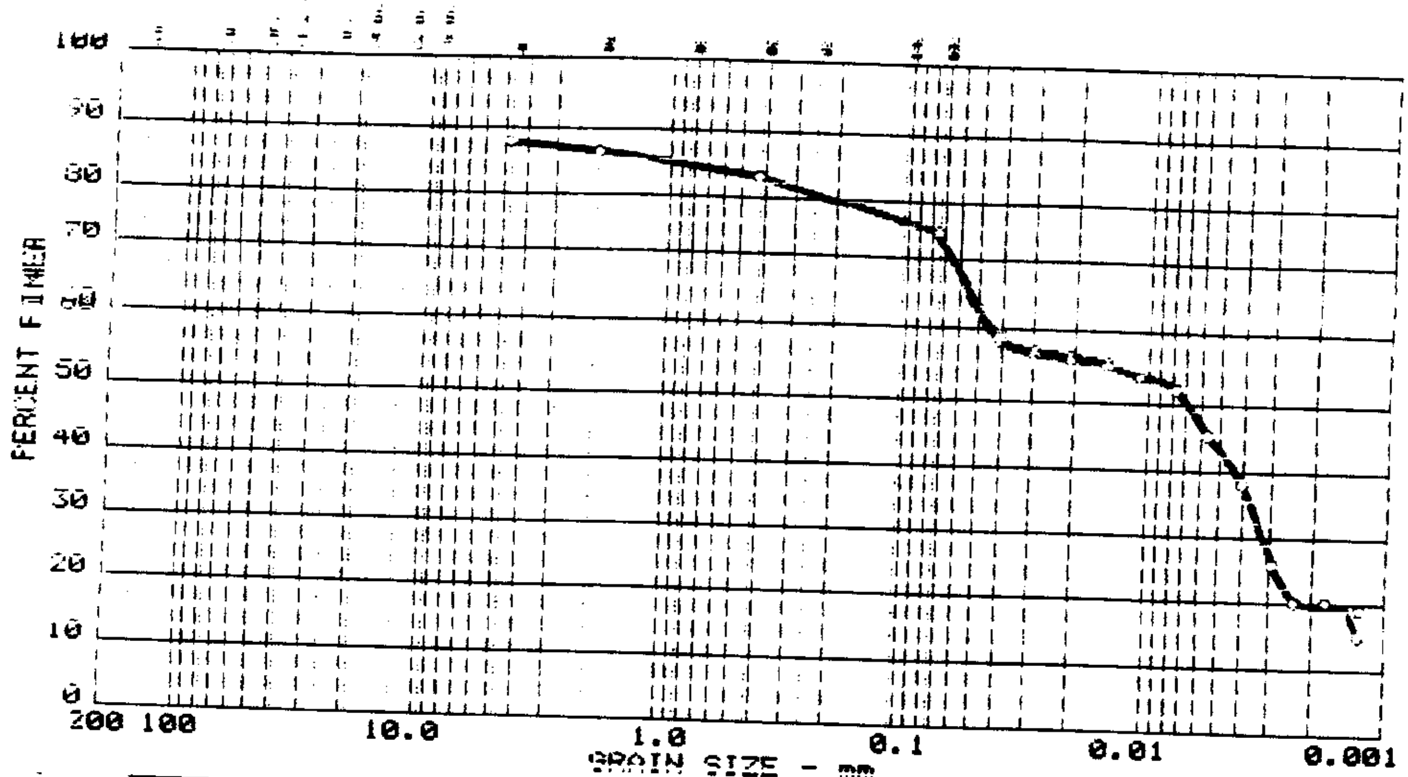
Remarks:

Date: SEPTEMBER 23, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	0.0	11.9	13.4	31.5	43.2

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
25.2	7	3.371		3.007	3.003				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, SOME GRAVEL, SOME SAND.	CL	A-4(4)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-27 SAMPLE NO 17

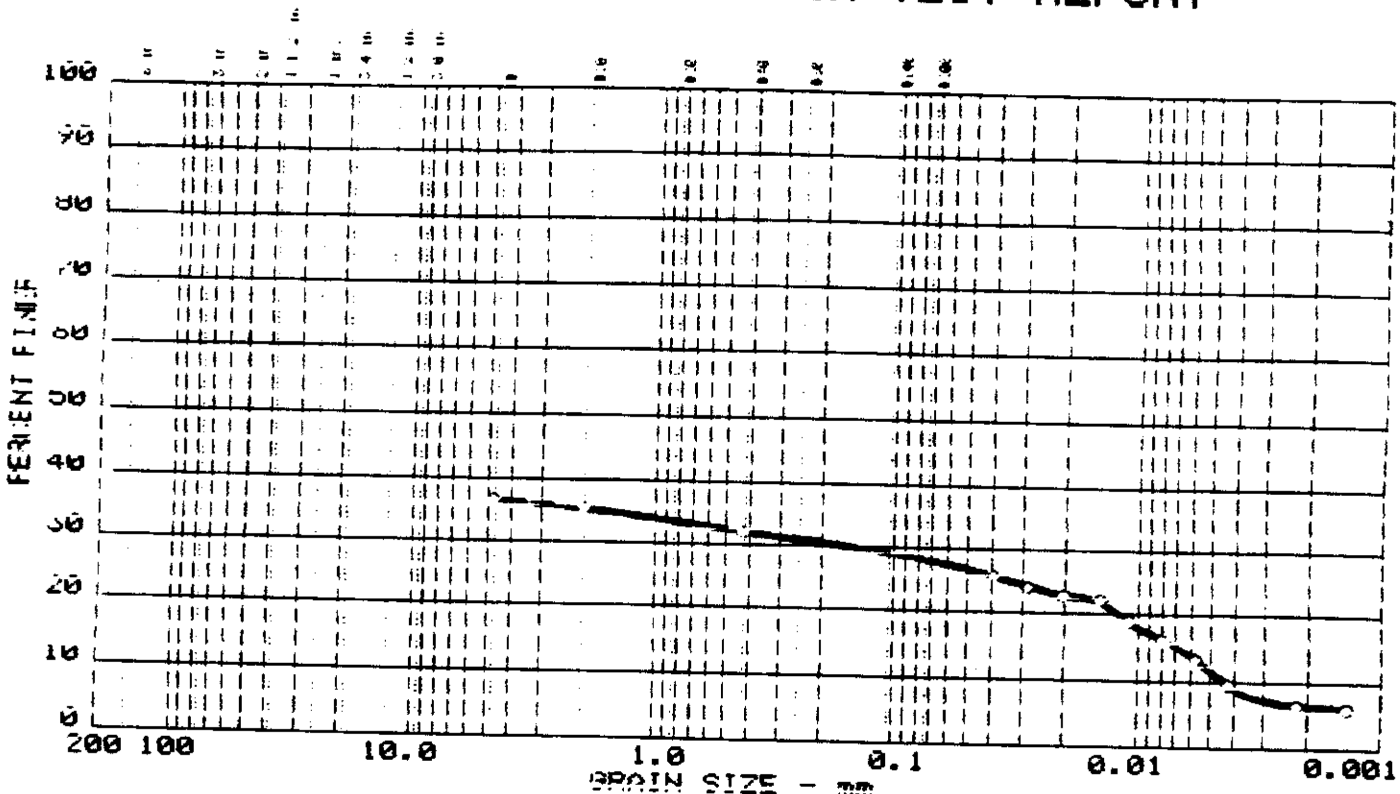
Date: SEPTEMBER 26, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
11	0.0	63.5	8.4	16.5	11.6

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
26.3	7	4.75	4.75	4.75	0.150	0.0066	0.0043	1.10	1096.5

MATERIAL DESCRIPTION	USCS	AASHTO
LIMESTONE GRAVEL, TRACE SAND, SOME SILT, SOME CLAY	GC	A-2-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-27 SAMPLE NO. 19

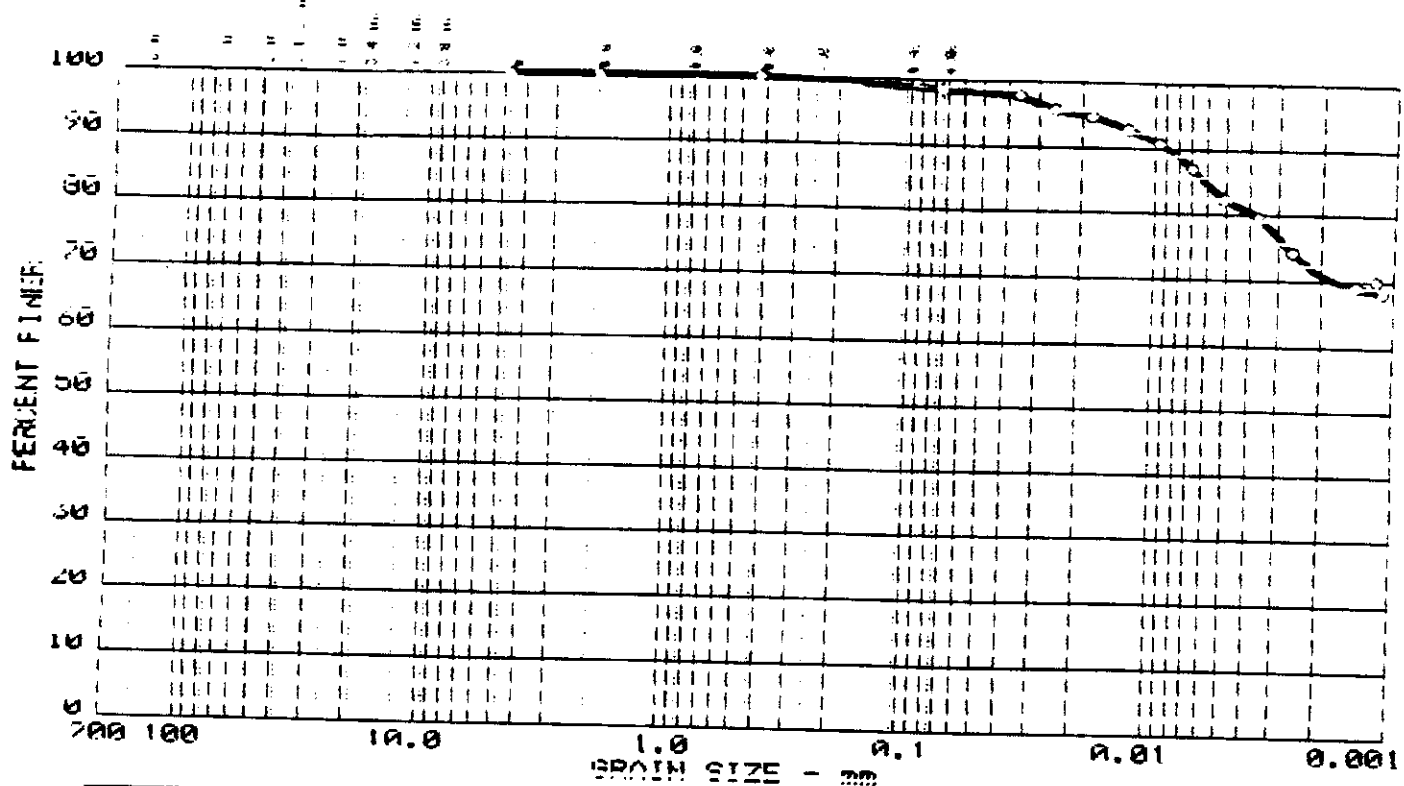
Date: SEPTEMBER 26, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.6

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	12	0.0	0.0	1.4	16.4	82.2

	LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
○	94.2	62.0								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, TRACE FINE SAND	CH	A-7-5(26)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-27 SAMPLE NO. 20 & 21

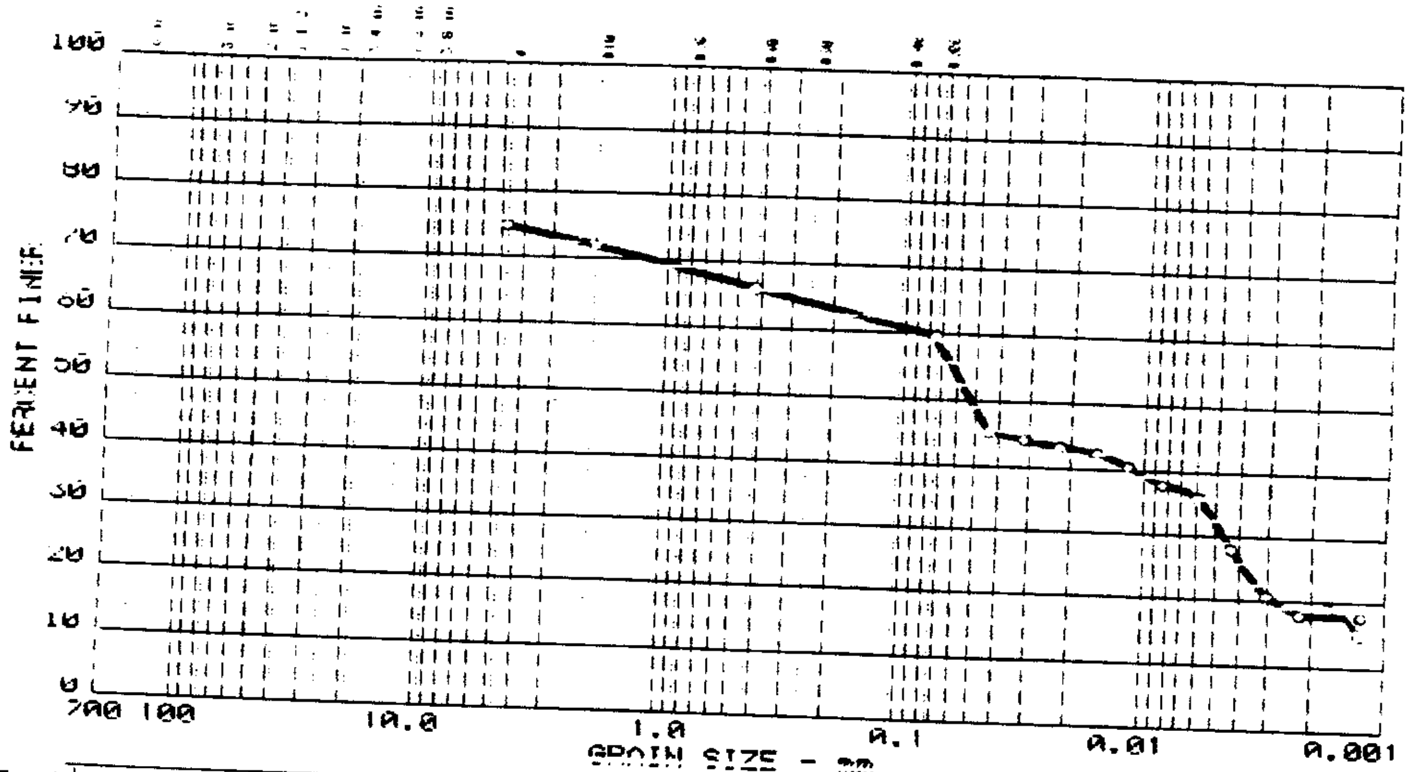
Date: SEPTEMBER 26, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.7

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
13	0.0	25.2	15.1	27.6	32.1

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
26.1	3.0	4.750	0.001	0.052	0.005				

MATERIAL DESCRIPTION	USCS	AASHTO
GRAVELLY SILTY CLAY, SOME SAND.	CL	A-4(10)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING FD-28 SAMPLE NO. 3

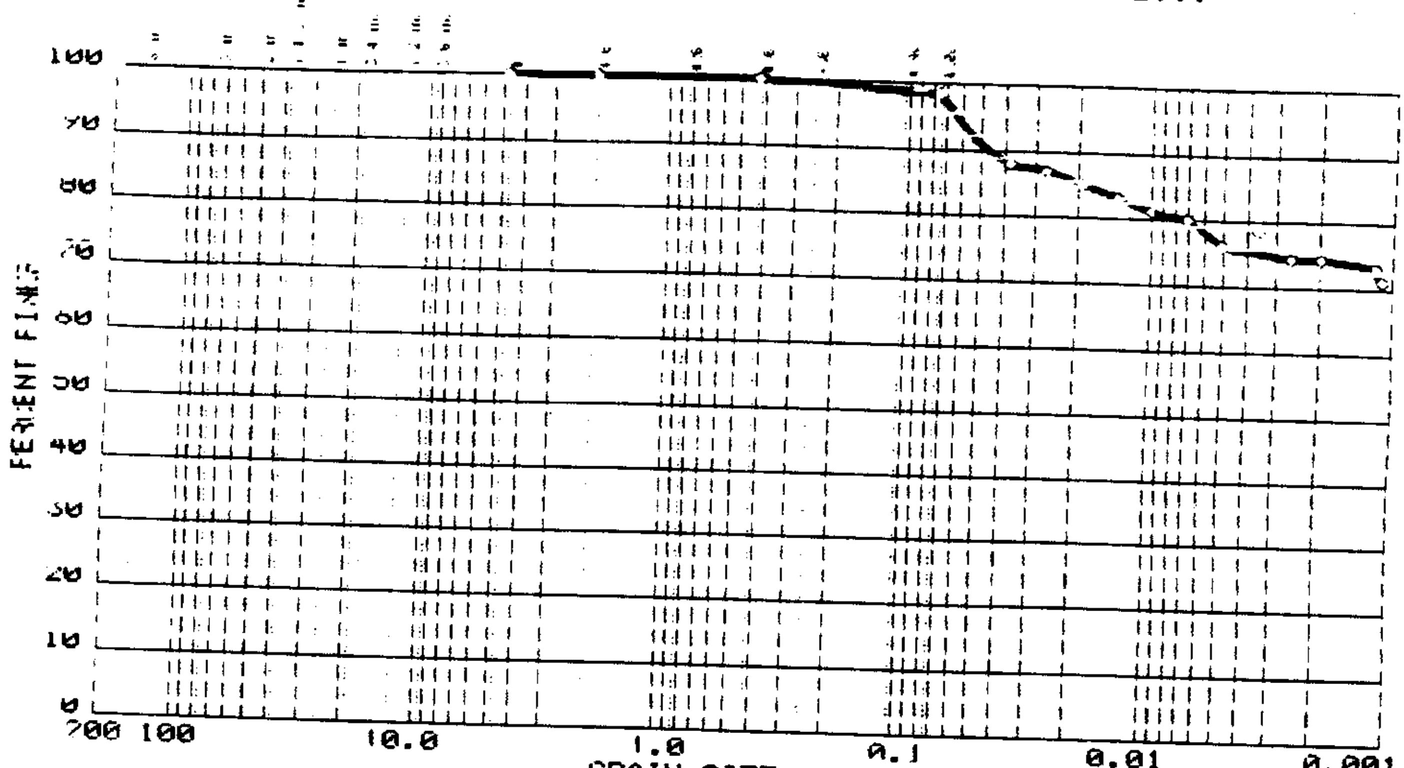
Date: SEPTEMBER 26, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
14	0.0	0.0	1.4	22.6	76.0

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
102.0	62								

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAY, TRACE SAND	CH	A-7-5(28)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING FD-28 SAMPLE NO. 5

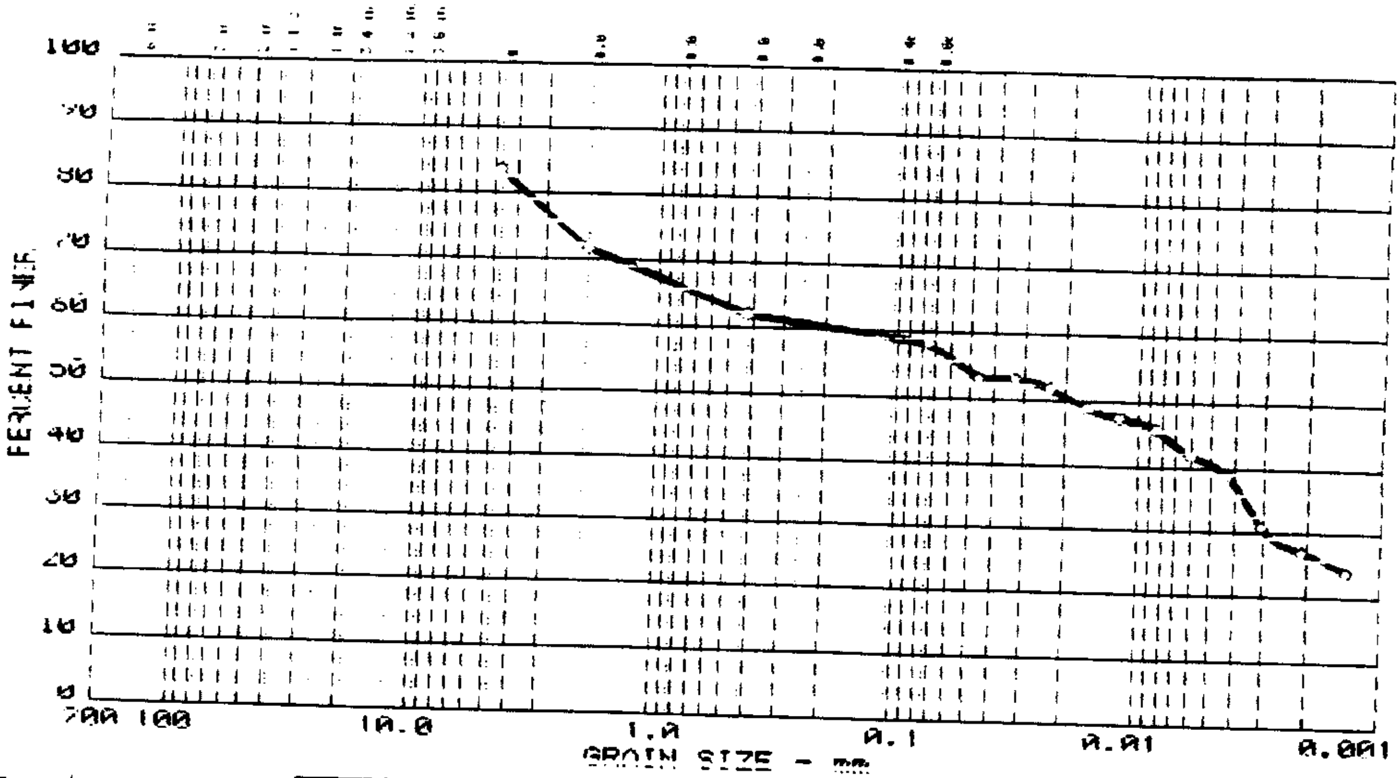
Date: SEPTEMBER 26, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
15	0.0	16.4	25.3	17.6	40.7

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
41.4	20.3	4.750	0.150	0.010	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY CLAY, SOME LIMESTONE GRAVEL, SOME SILT.	CL	A-7-6(9)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-26 SAMPLE NO. 9

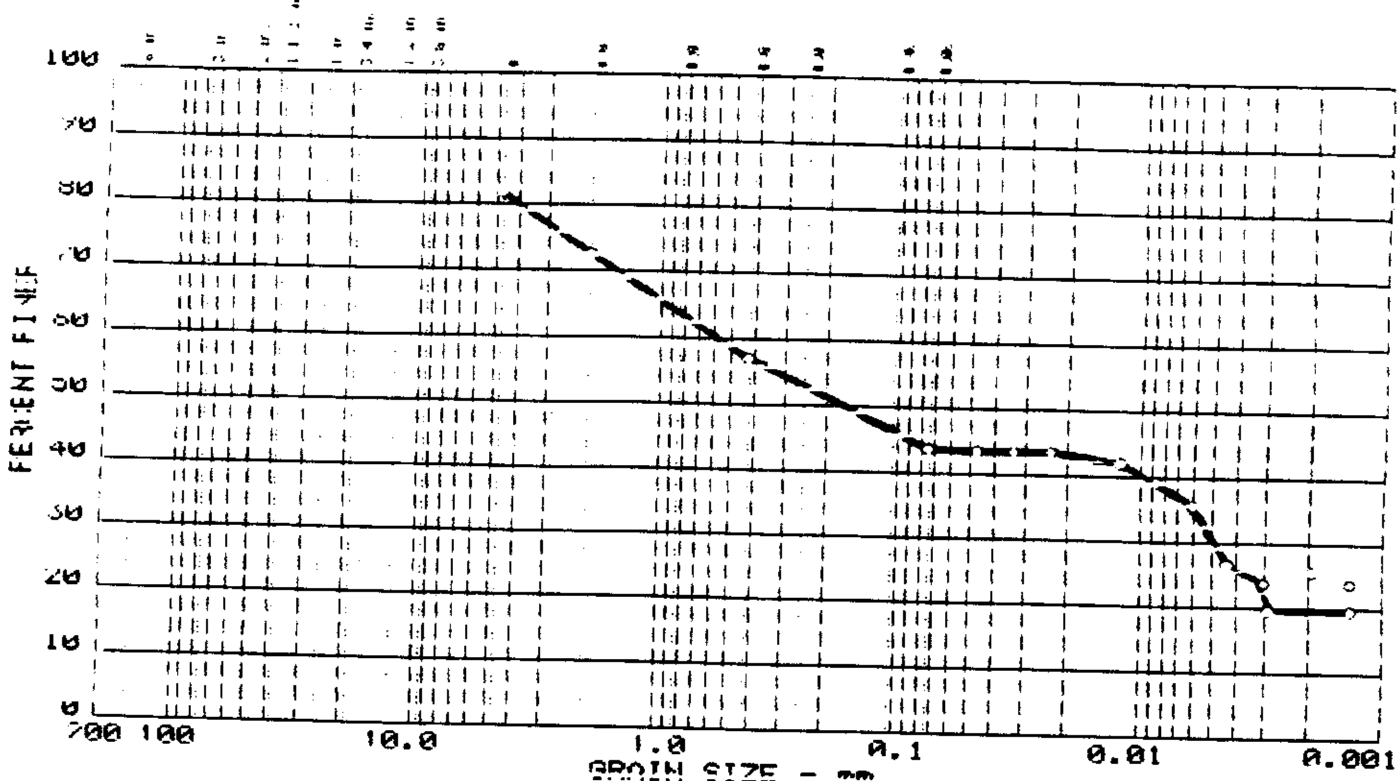
Date: SEPTEMEBER 26, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 16	0.0	16.1	38.1	15.4	30.4

LL	PI	D85	D60	D50	D30	D15	D10	Cc	Cu
		4.75	0.56	0.17	0.005				

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SAND, SOME SILT, SOME GRAVEL		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-26 SAMPLE NO. 11

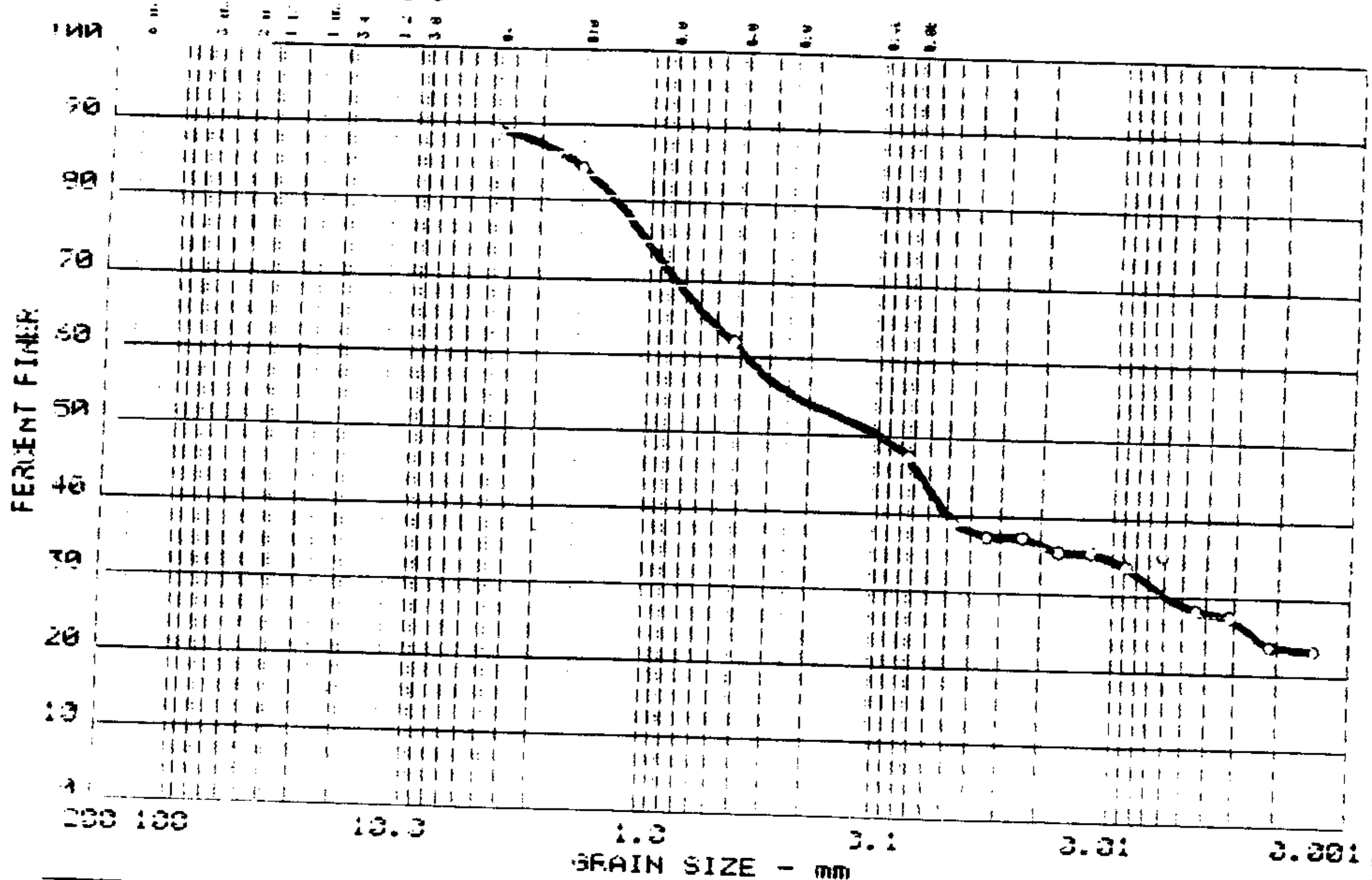
Date: SEPTEMBER 26, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
1	0.0	10.8	41.7	18.7	28.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
		2.163	0.376	0.098	0.006				

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SAND, SOME SILT, SOME GRAVEL.		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD 29 SAMPLE NO. 10

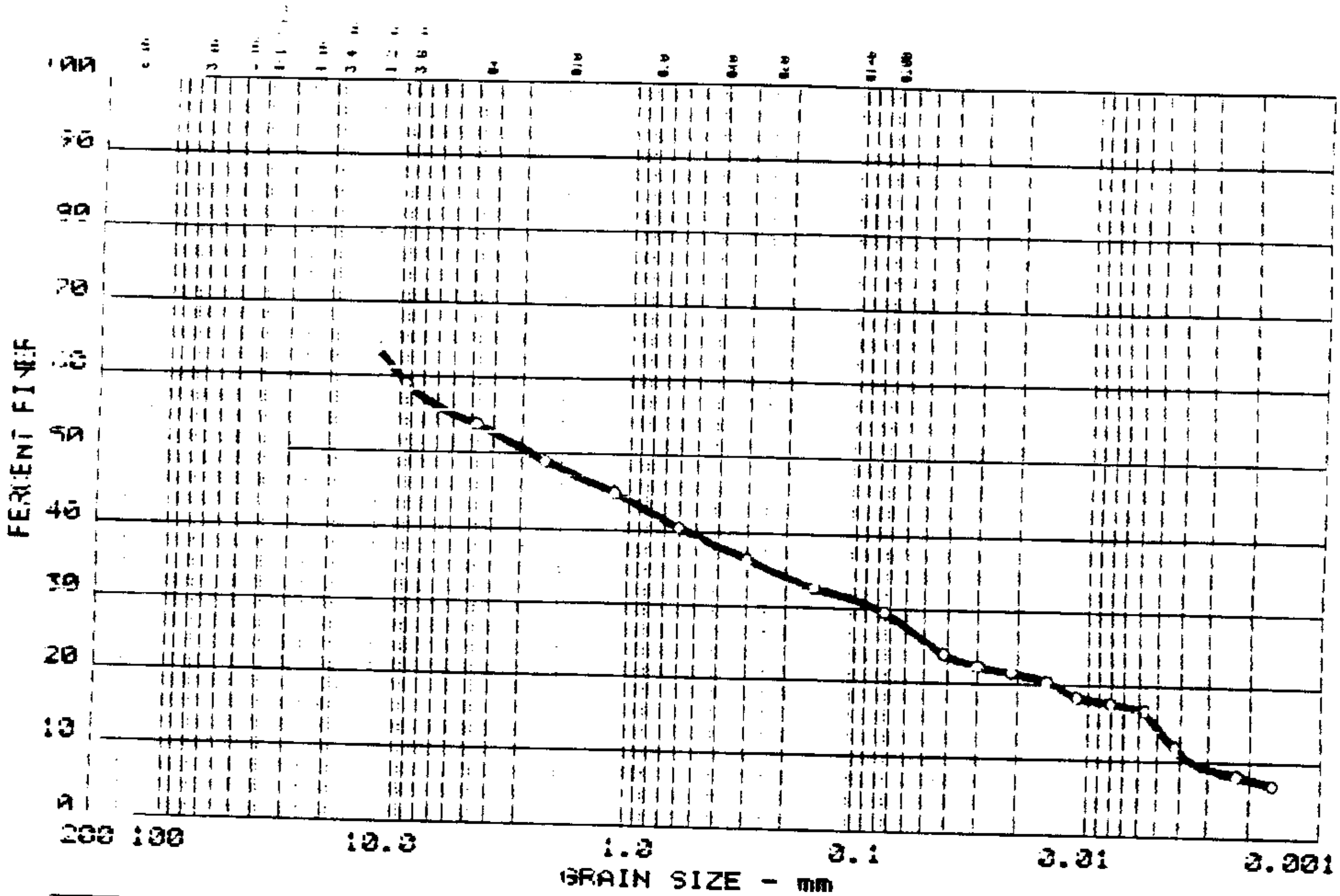
Date: SEPTEMBER 26, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	0.0	46.2	24.3	15.2	14.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	28.8	3.5	12.70	10.09	2.72	0.080	0.0052	0.0036	0.18	2818.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL, SOME SILT, SOME CLAY.	GC-GM	A-2-4(0)

Project No.: USM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-29 SAMPLE NO. 11

Date: SEPTEMBER 26, 1994

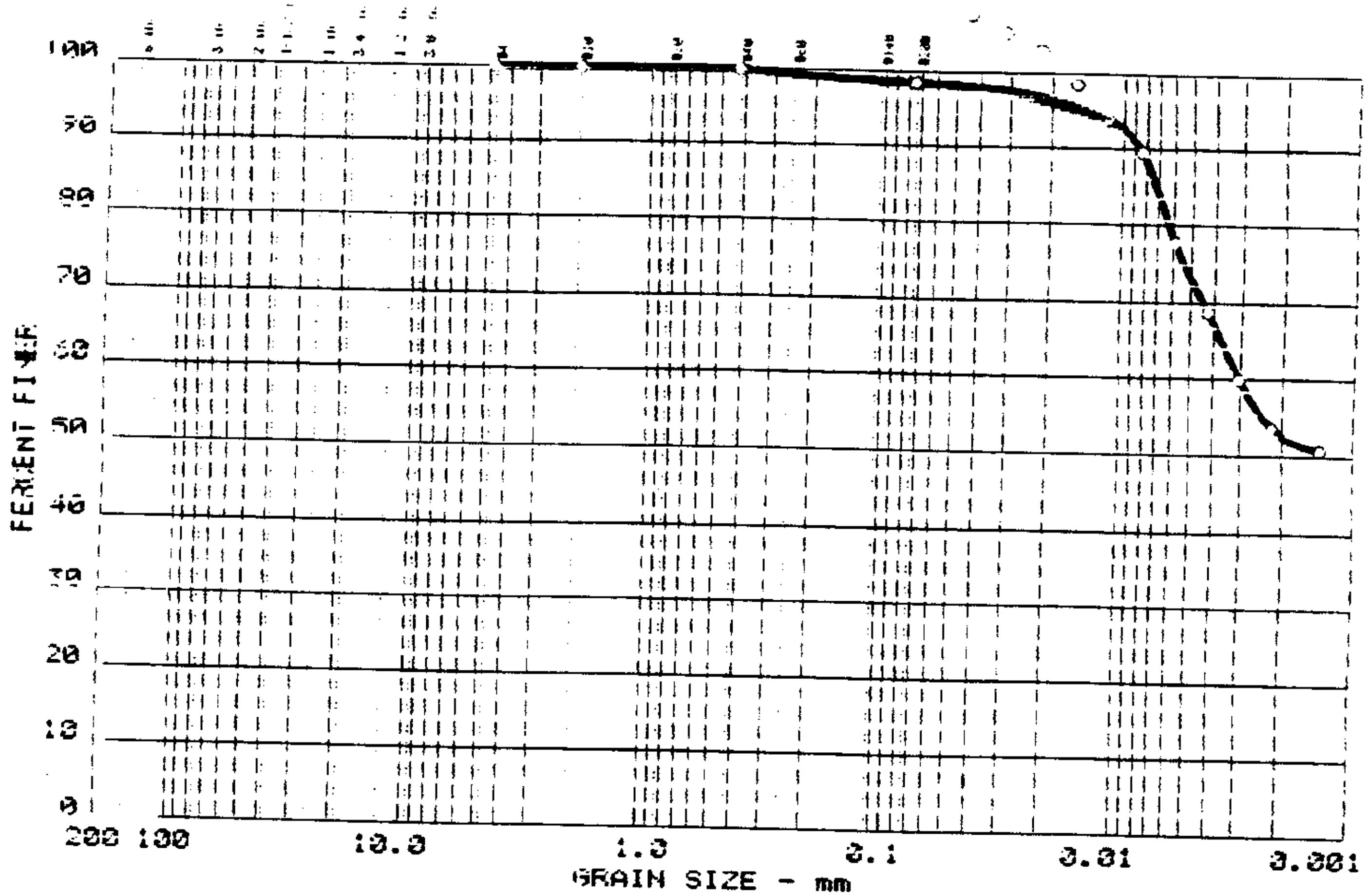
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 18	0.0	0.0	1.4	25.7	72.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	52.7	32.1								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, TRACE FINE SAND.	CH	A-7-6(35)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-29 SAMPLE NO. 14

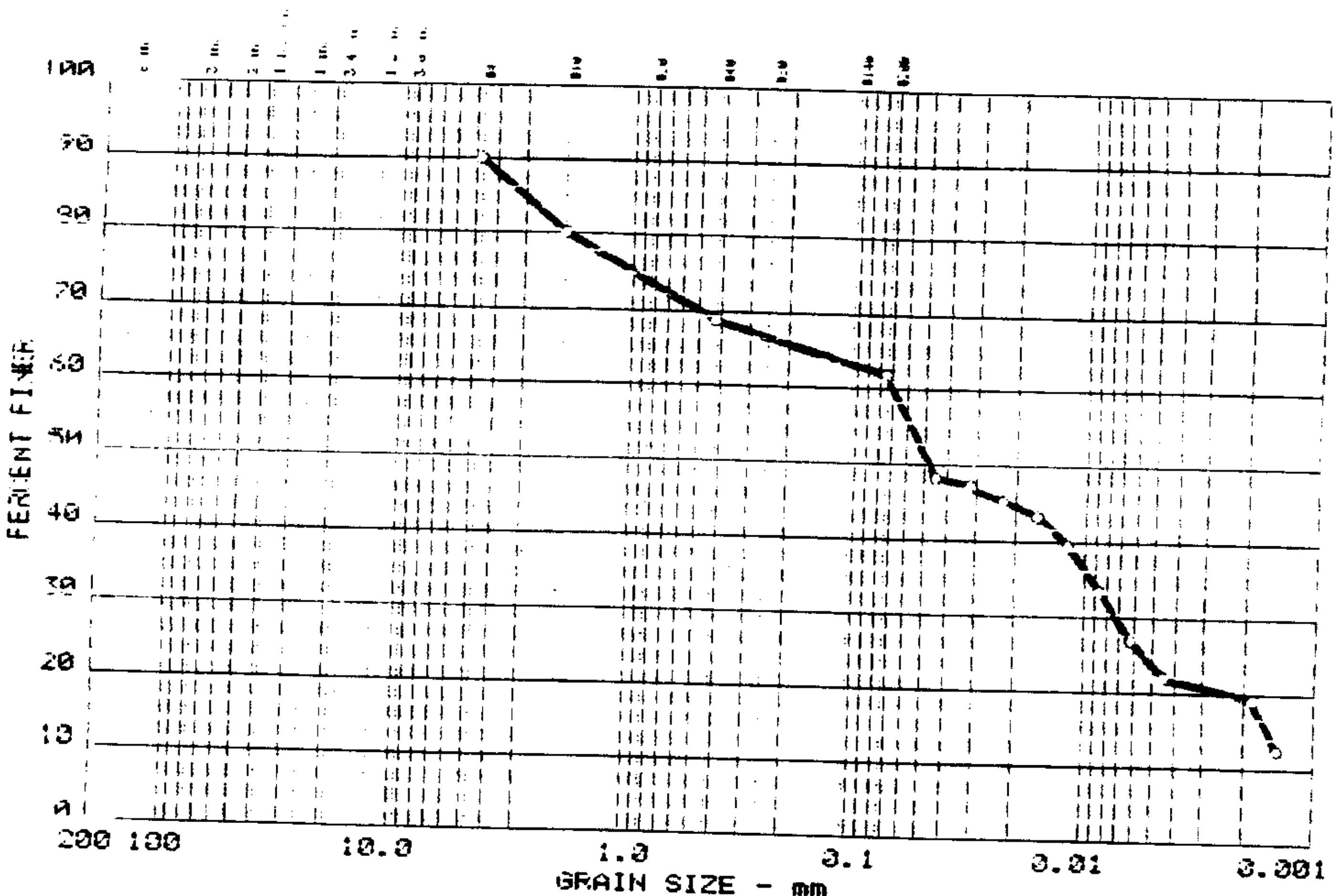
Date: SEPTEMBER 26, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	2	0.0	10.0	28.1	38.3	23.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			3.355		0.048	0.007	0.0016			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY CLAYEY SILT, TRACE GRAVEL.		

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-29 SAMPLE NO. 20

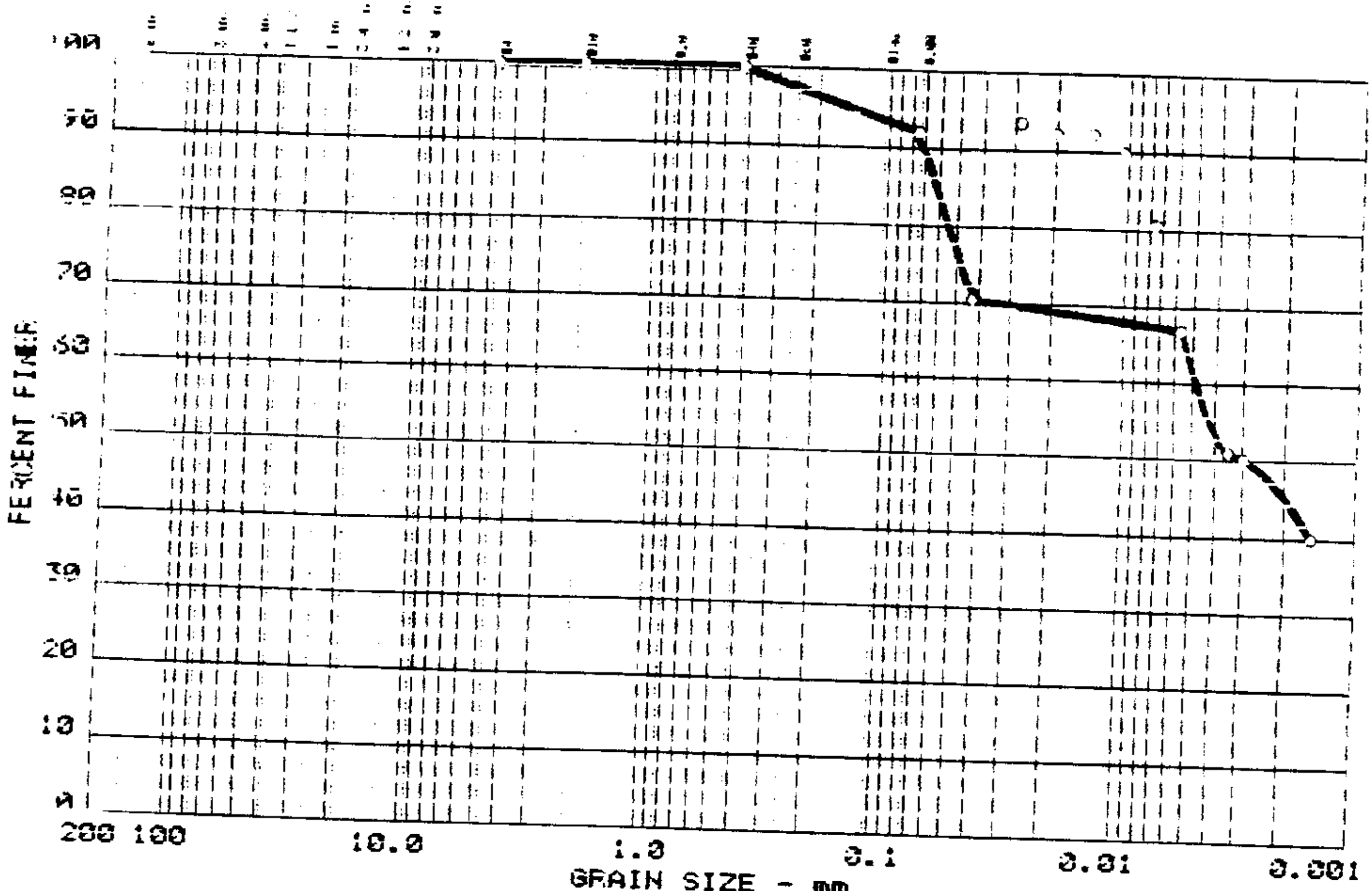
Date: SEPTEMBER 26, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 3	0.0	0.0	8.0	30.8	61.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	42.01	23.7			0.003					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, TRACE SAND.	CH	A-7-6(16)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-29 SAMPLE NO. 25

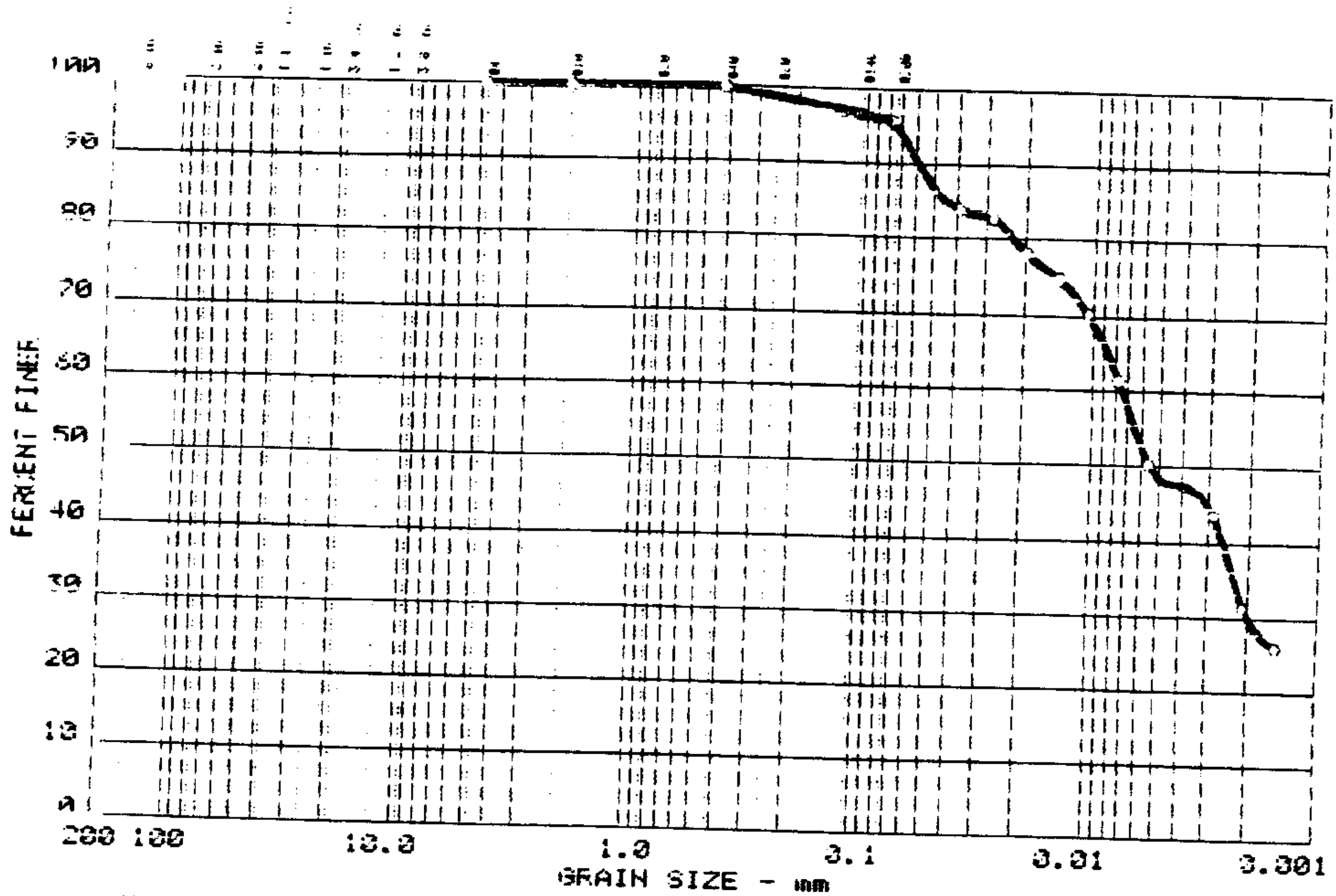
Date: SEPTEMBER 27, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
4	0.0	0.0	3.9	47.8	48.3

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
32.2	11.2			0.006	0.002				

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY CLAY, TRACE FINE SAND.	CL	A-7-6(23)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PB-30 SAMPLE NO. 3

Date: SEPTEMBER 27, 1994

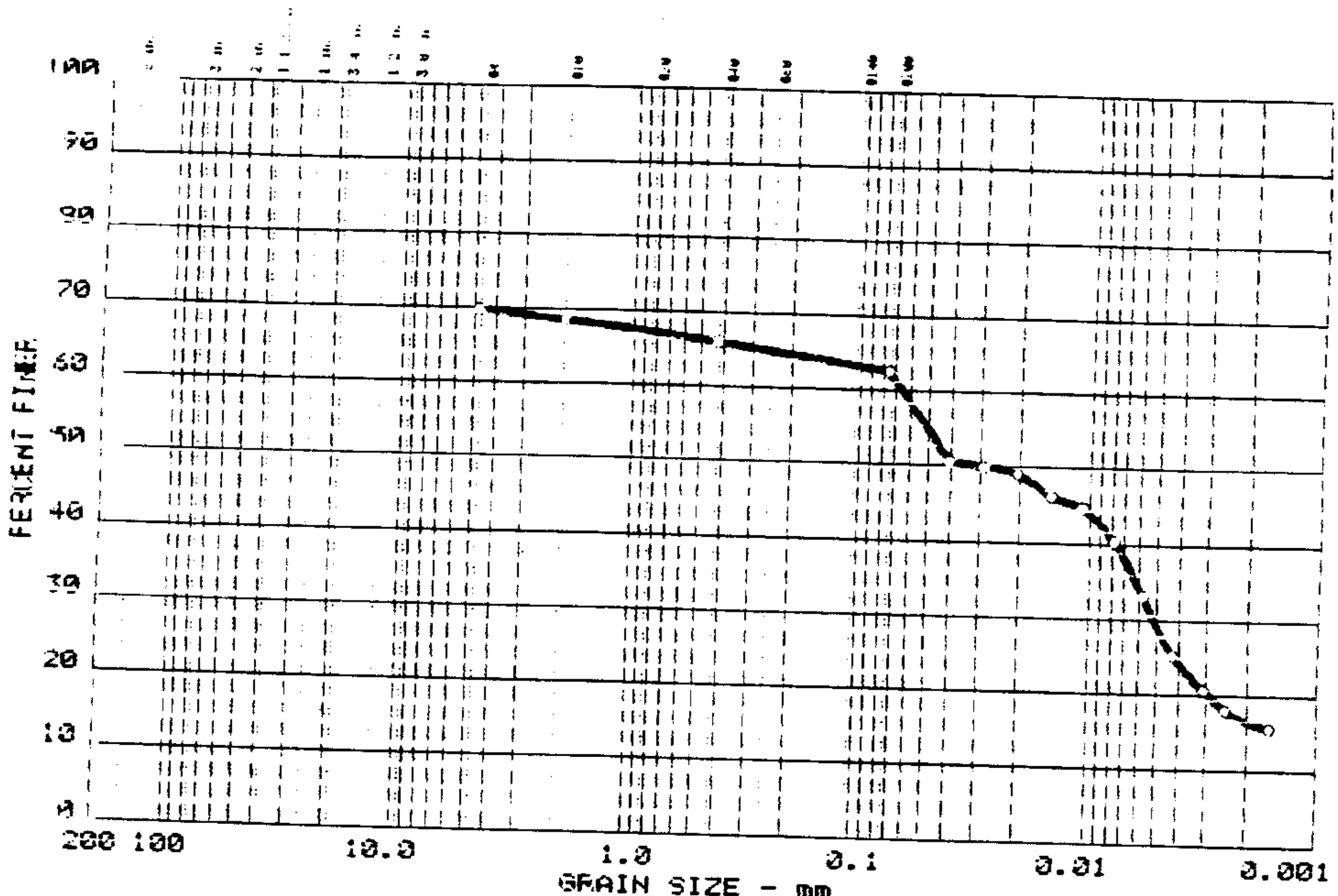
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	0.0	30.2	7.2	33.6	29.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	21.5	6.2	4.750		0.031	0.005				

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY CLAYEY SILT, TRACE SAND.	CL-ML	A-4(1)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-30 SAMPLE NO. 5

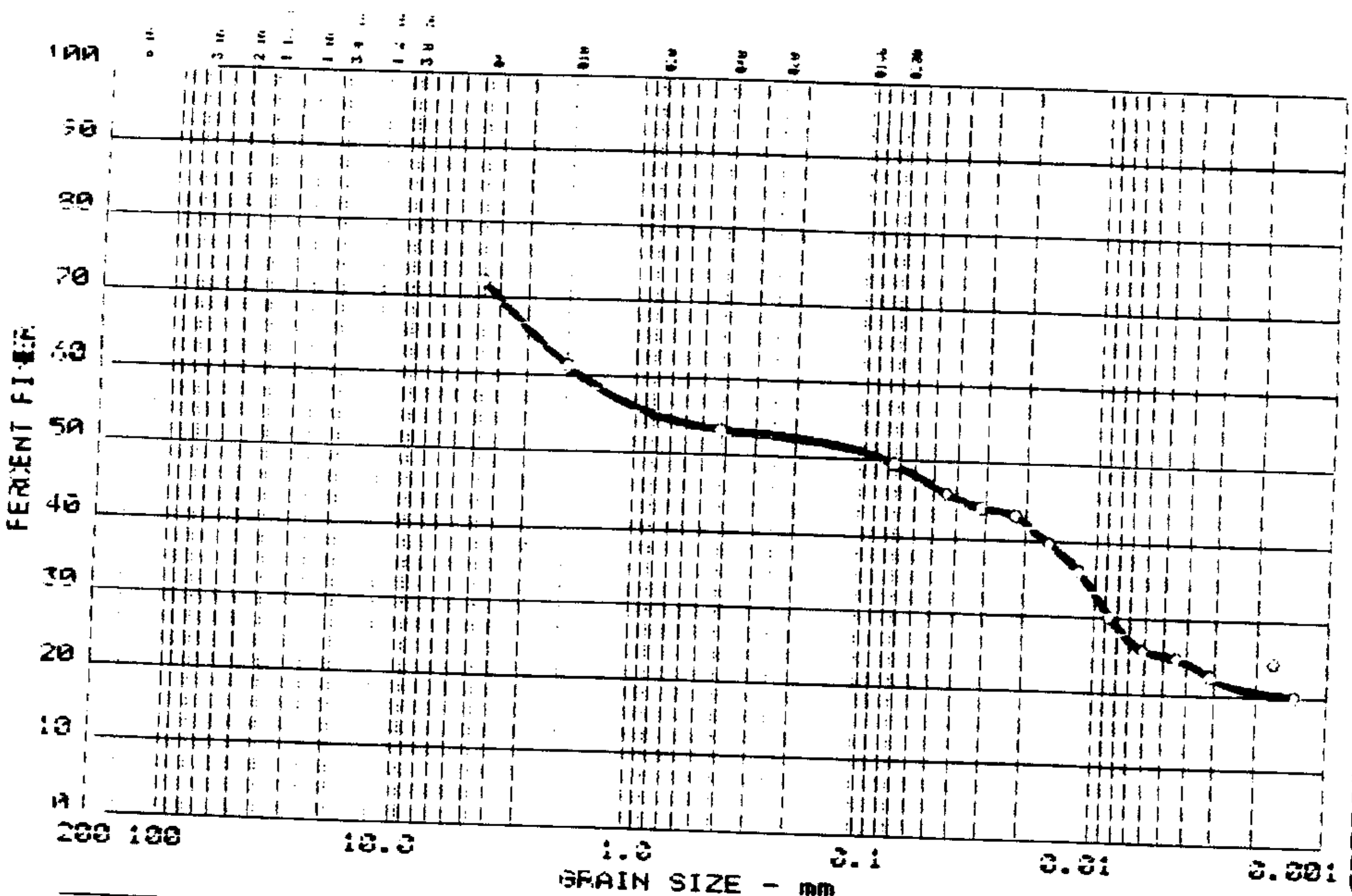
Date: SEPTEMBER 27, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	6	0.0	27.9	22.6	24.4	25.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	45.95	33.3	4.750	1.765	0.002	0.009				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAYEY SANDY GRAVEL.	SC	A-7-6(11)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PB 30 SAMPLE NO. 7

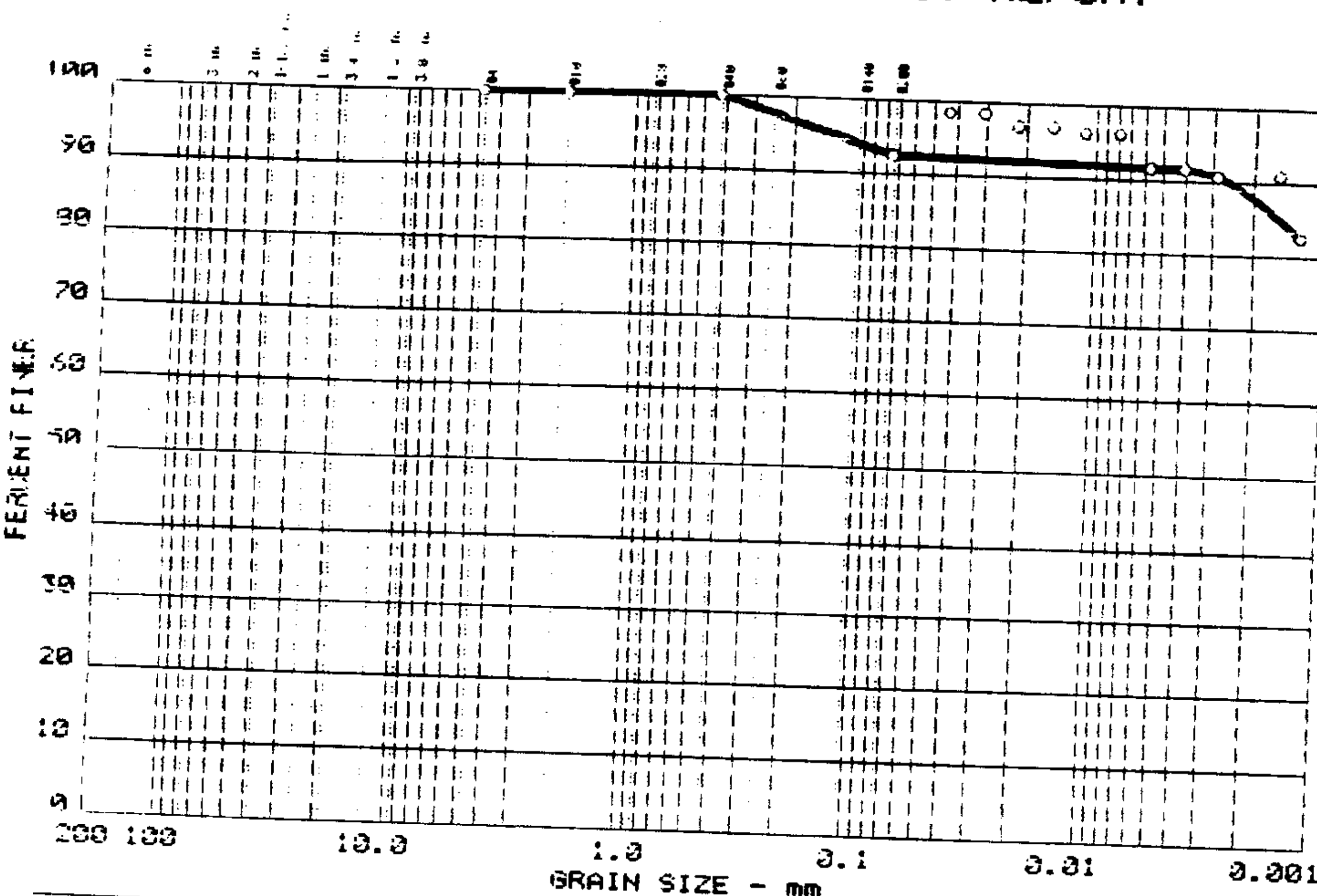
Date: SEPTEMBER 27, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
7	0.0	0.0	7.5	0.9	91.6

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
89.54	55.14								

MATERIAL DESCRIPTION	USCS	AASHTO
CLAY, TRACE SAND.	CH	A-7-6(58)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-30 SAMPLE NO. 11

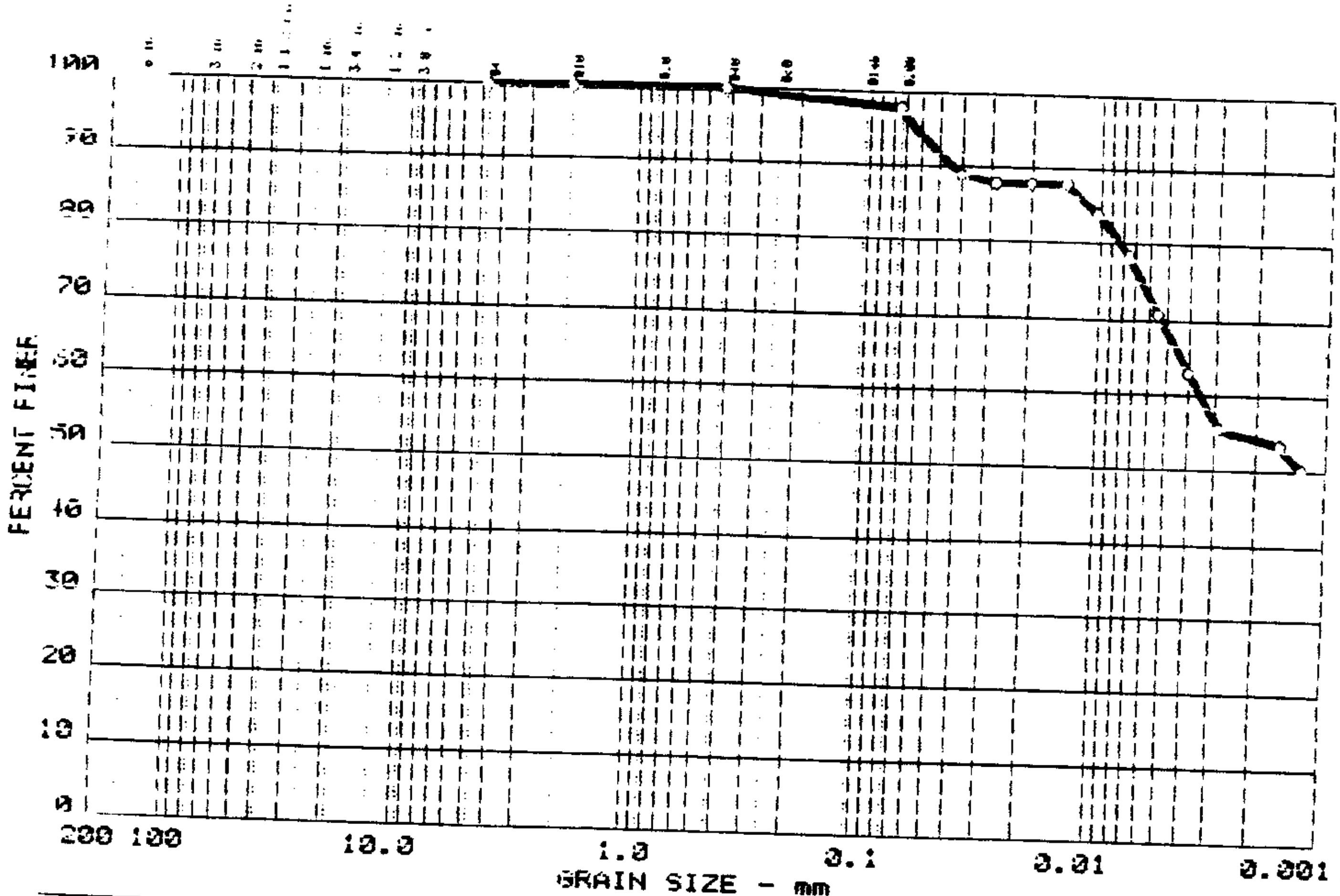
Date: SEPTEMBER 27, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 8	0.0	0.0	2.1	29.6	68.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	62.0	39.6								

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAY, TRACE FINE SAND.	CH	A-7-6(45)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-30 SAMPLE NO. 17

Date: SEPTEMBER 27, 1994

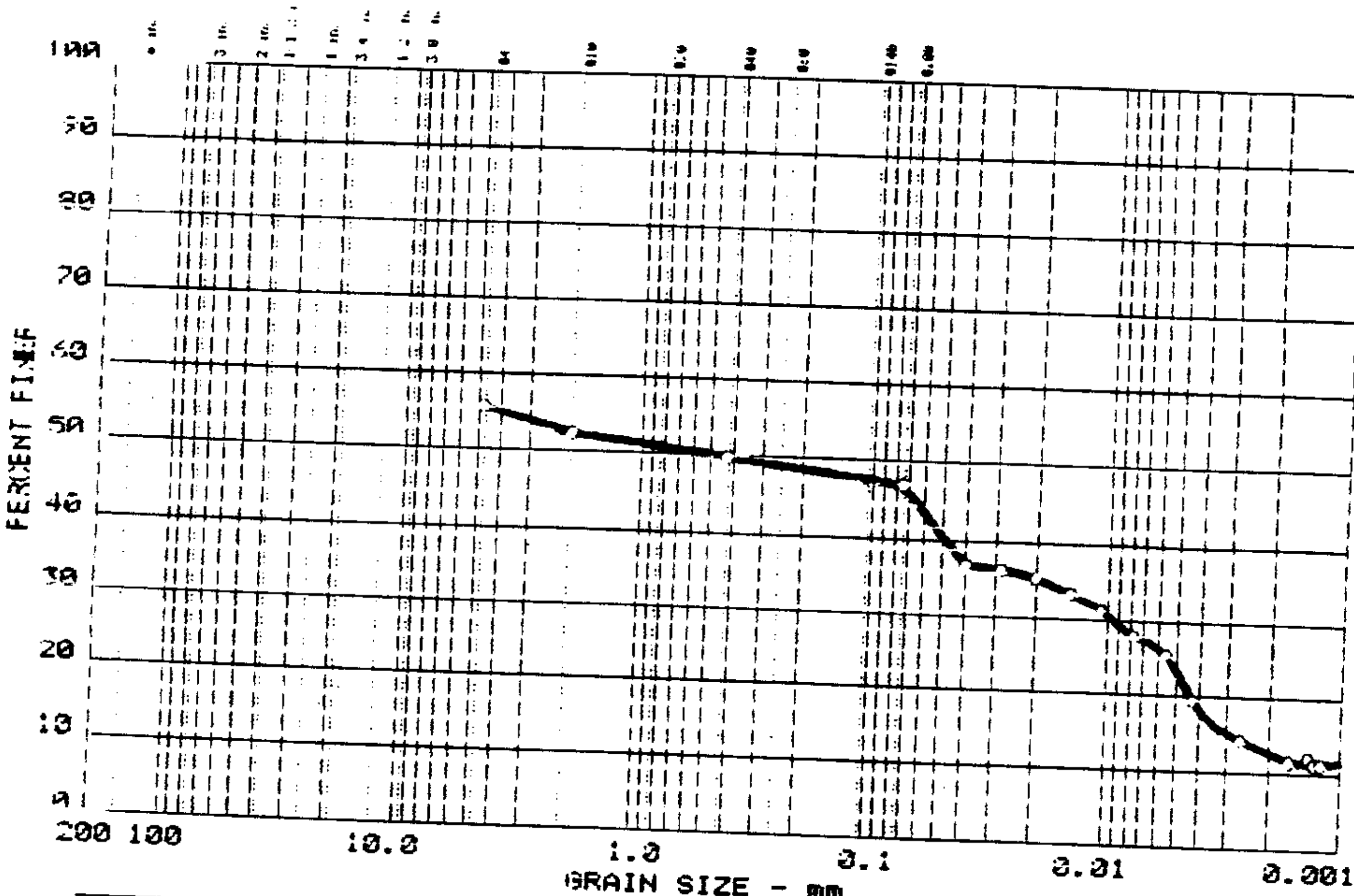
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 9	0.0	44.3	8.8	23.8	23.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	30.1	13	4.75	4.75	0.44	0.009	0.0030			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY CLAYEY GRAVEL, TRACE SAND.	GC	A-6(3)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-30 SAMPLE NO. 19

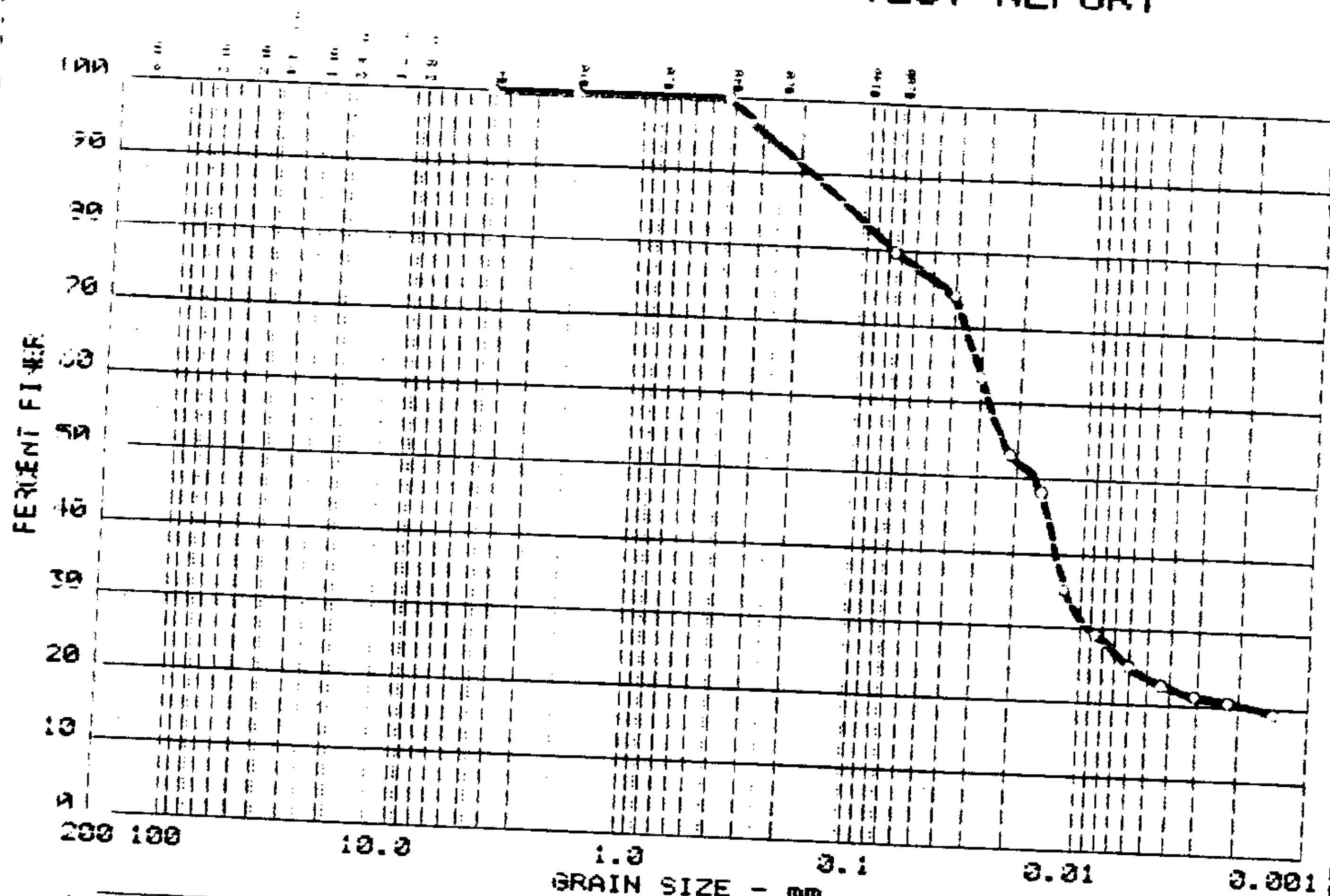
Date: SEPTEMBER 27, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.6

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 10	0.0	0.0	20.3	56.2	23.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	23.5	2.5	0.117		0.017	0.009				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY CLAYEY SILT.	ML	A-4(16)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PB-31 SAMPLE NO. 5

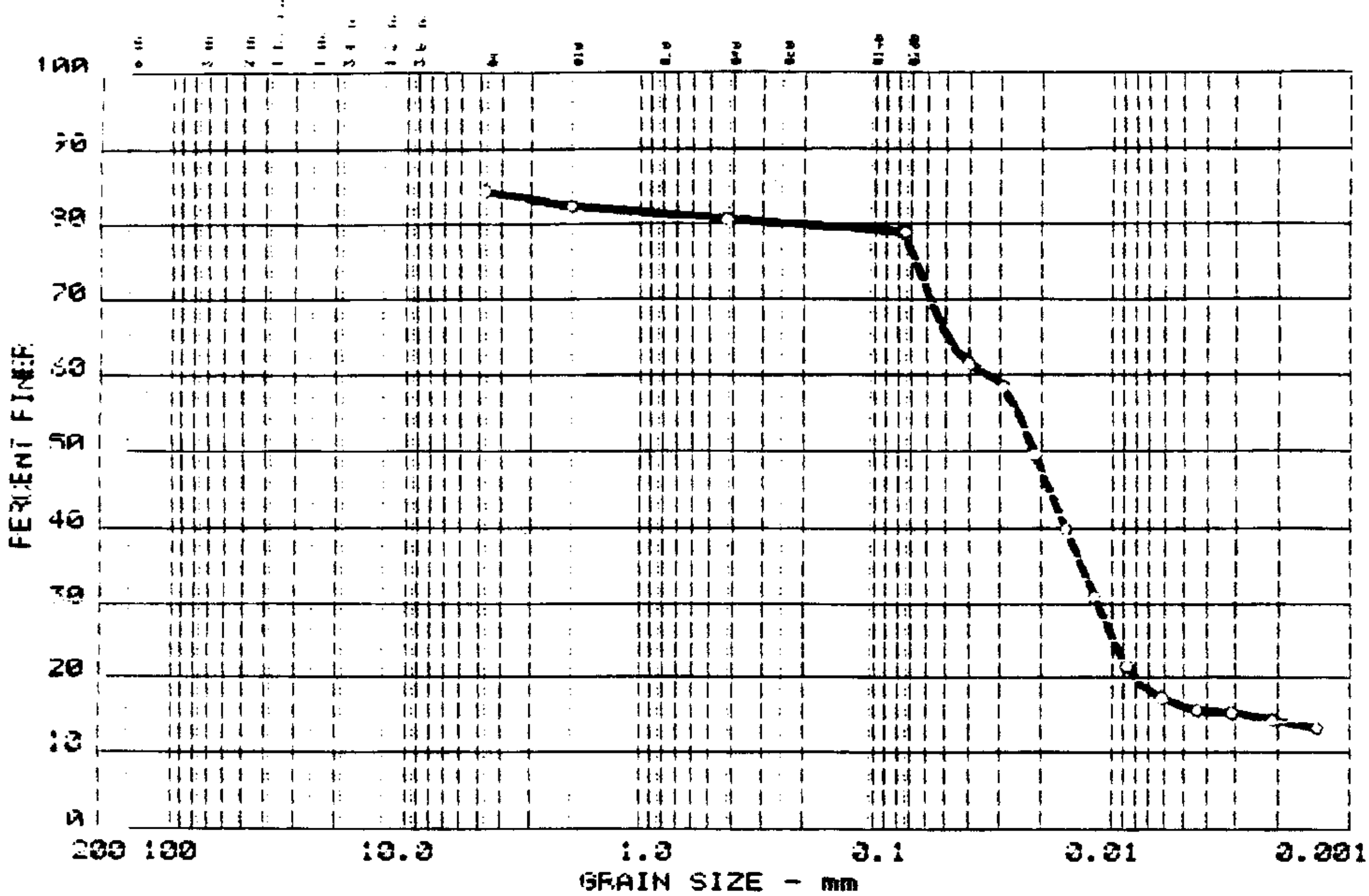
Date: SEPTEMBER 27, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○	11	0.0	15.6	5.5	63.0	15.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	21.1	5.5	4.750		0.021	0.012	0.0028			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT, SOME CLAY, SOME GRAVEL, TRACE SAND.	CL-ML	A-4(2)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PB-31 SAMPLE NO. 7

Date: SEPTEMBER 27, 1994

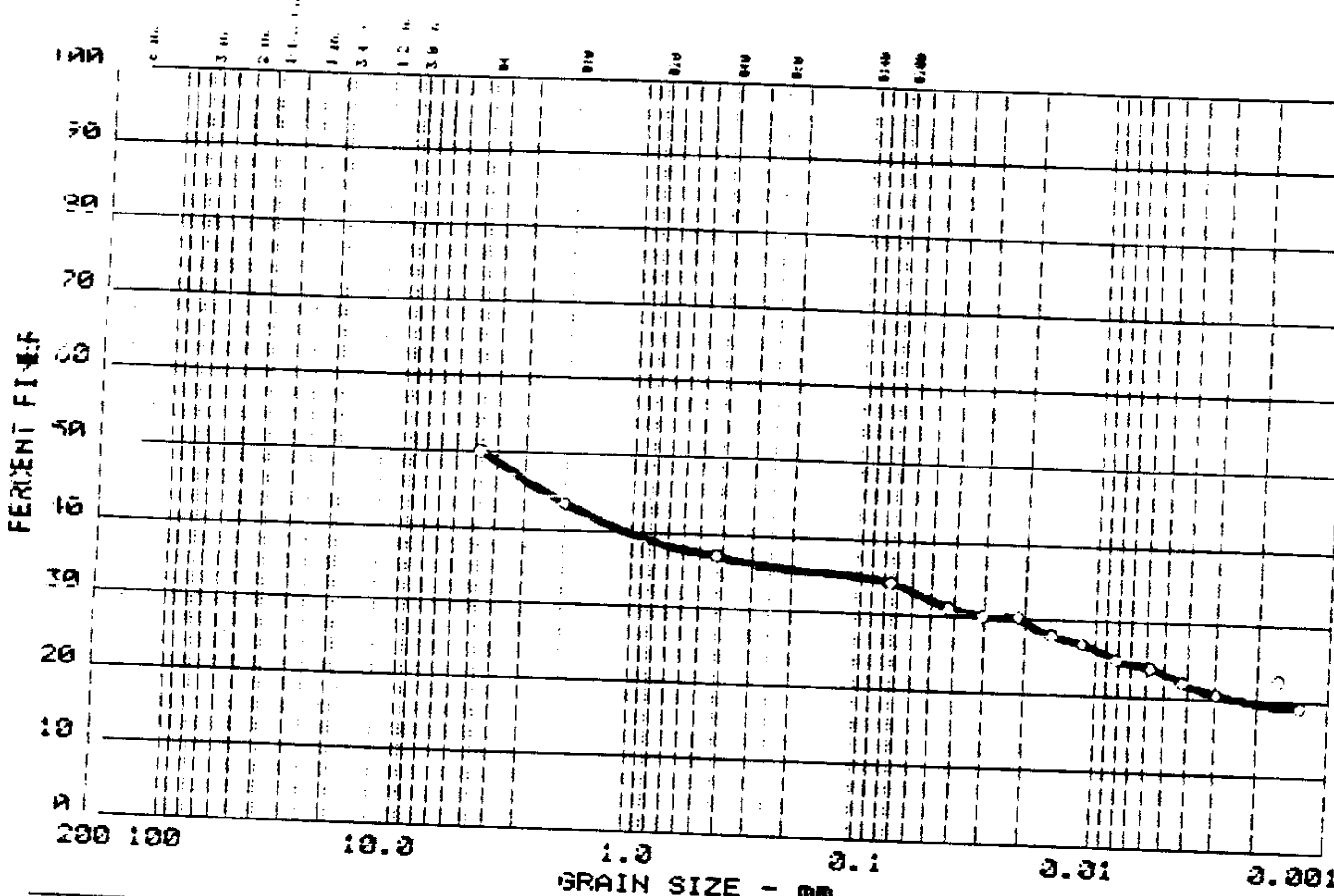
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
12	0.0	49.9	15.8	11.2	23.1

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
45.1	27.0	4.75	4.75	4.64	0.321				

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY GRAVEL, SOME SILT, SOME SAND.	GC	A-2-7(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-31 SAMPLE NO.10

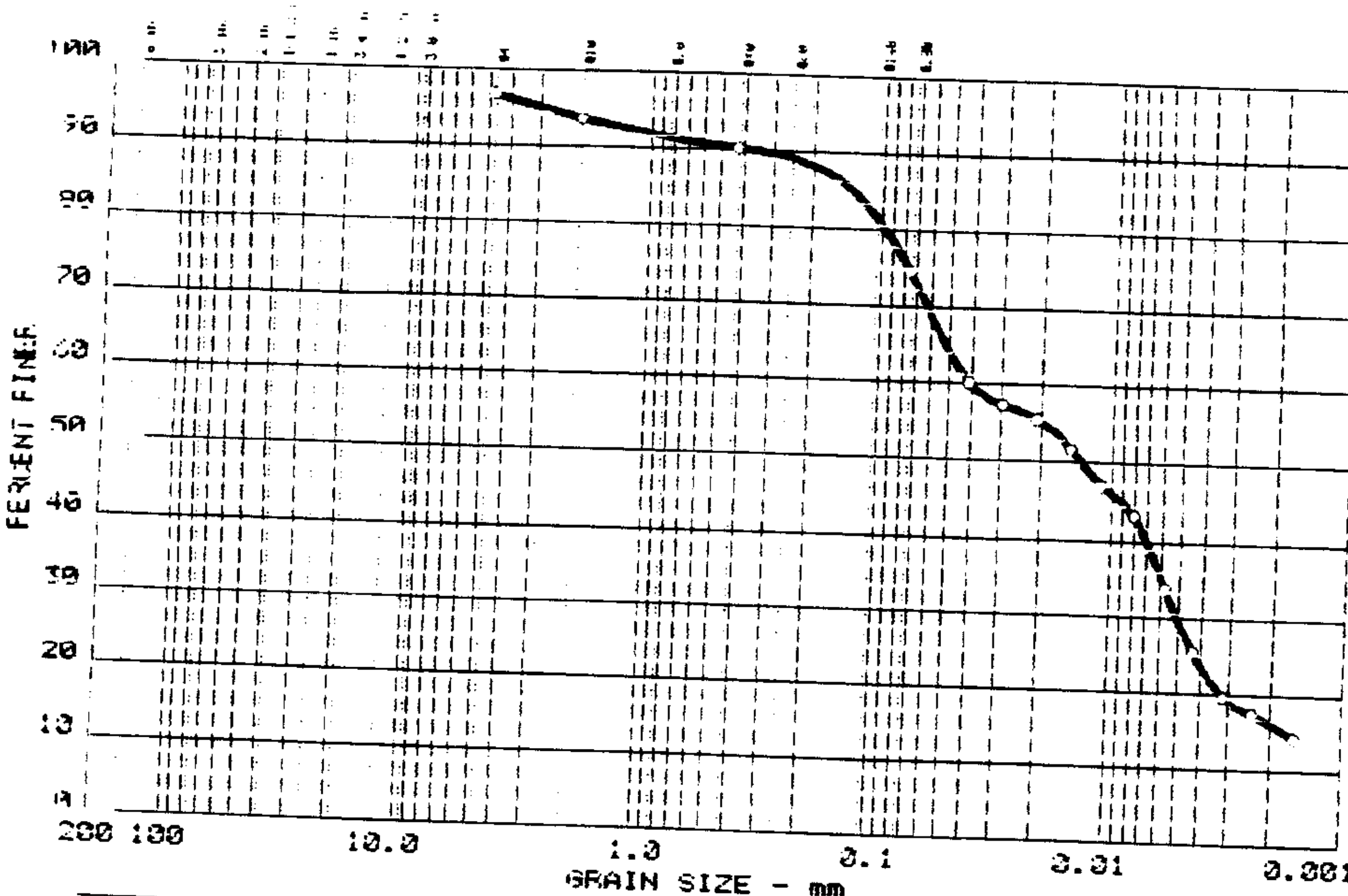
Date: SEPTEMBER 27, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
13	0.0	3.2	22.2	45.3	29.3

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
20.46	.9	0.136		0.013	0.005	0.0017			

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SILT, SOME SAND, TRACE GRAVEL.	ML	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-32 SAMPLE NO. 3

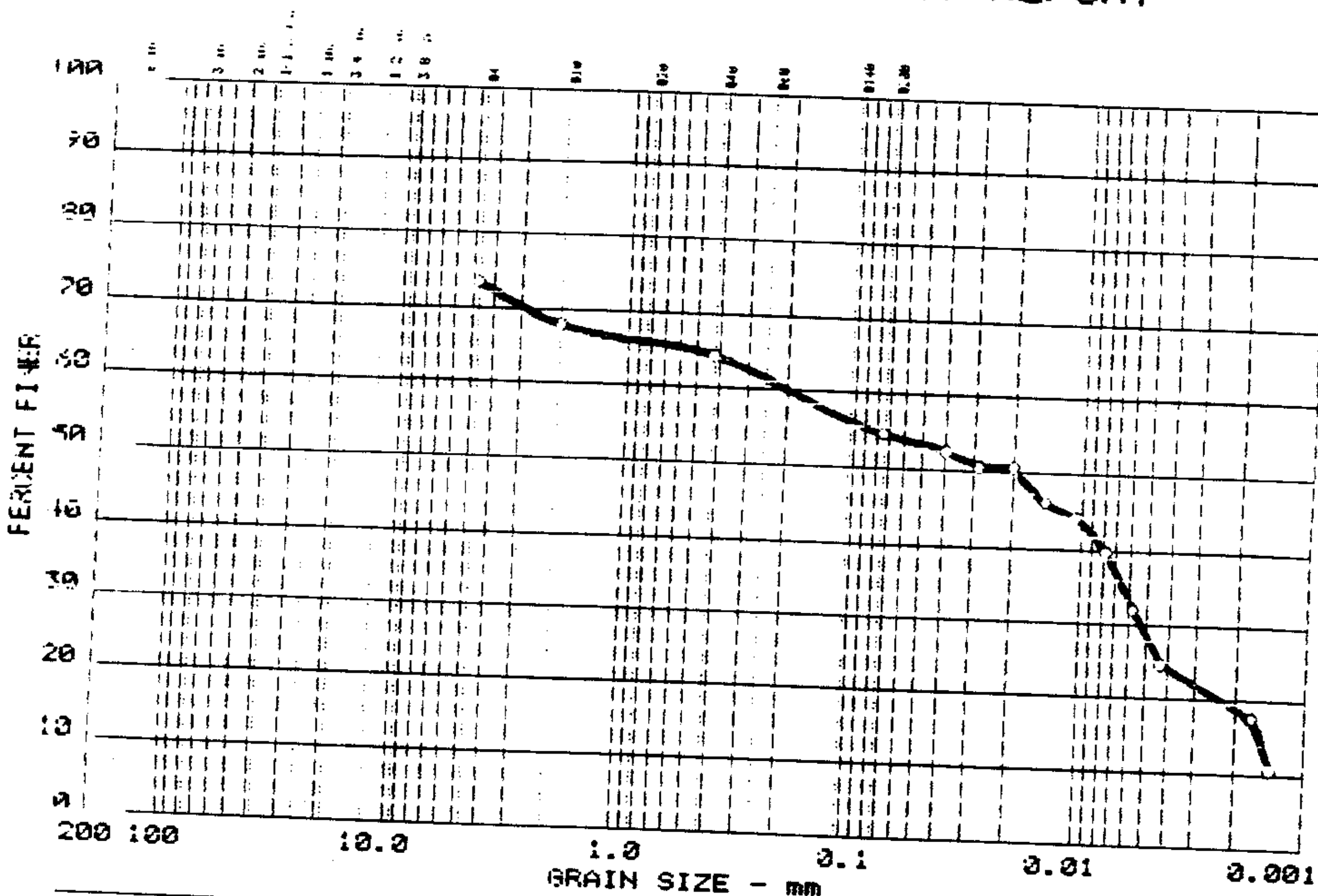
Date: SEPTEMBER 28, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 14	0.0	26.5	18.8	26.3	28.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	33.96	16.5	4.750	0.198	0.019	0.005	0.0016			

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SILTY CLAY, SOME SAND.	CL	A-6(6)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-32 SAMPLE NO. 6

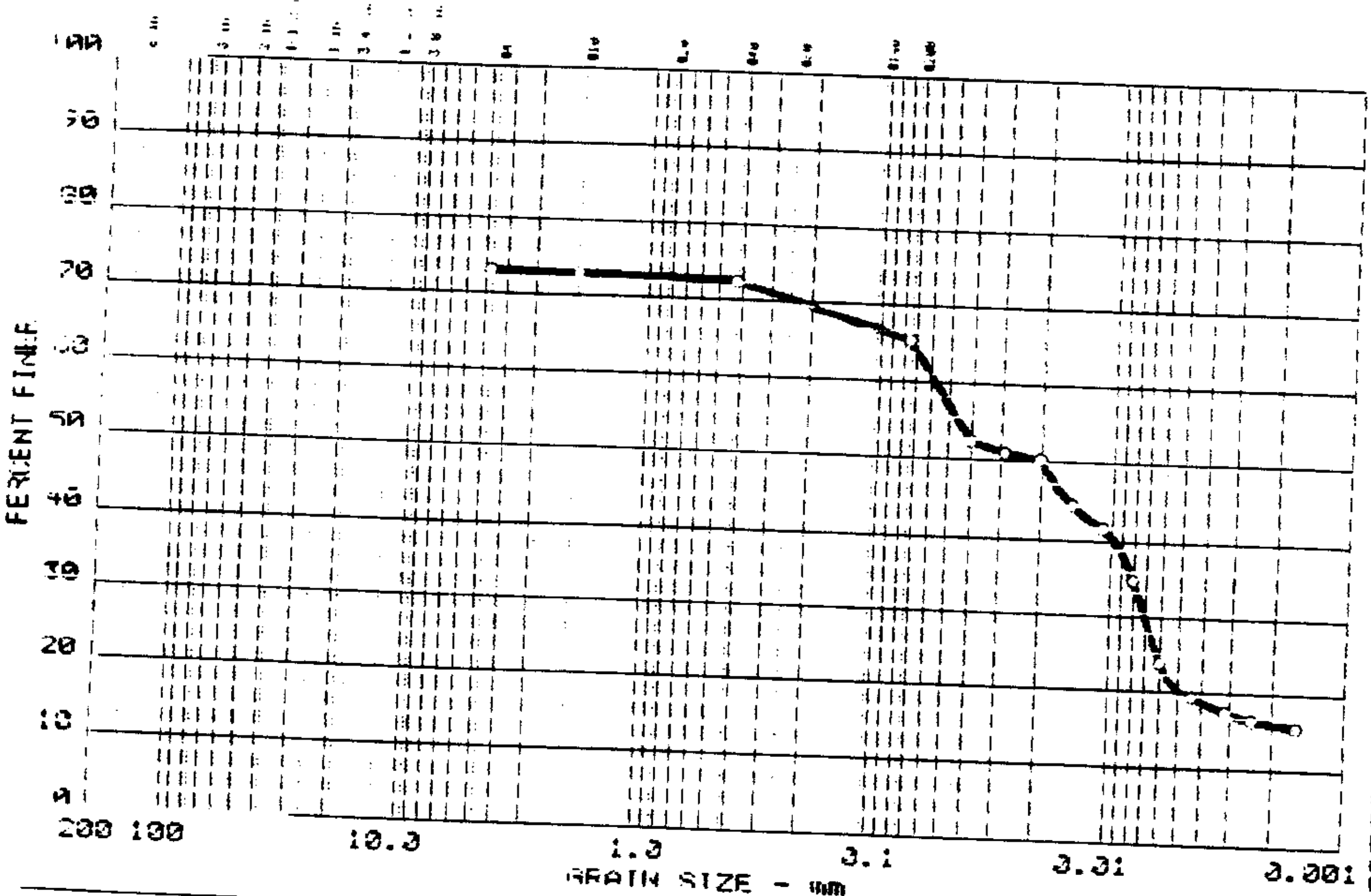
Date: SEPTEMBER 28, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No.2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
15	0.0	27.0	7.6	45.3	20.1

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
21.?	3.2	4.750		0.020	0.007				

MATERIAL DESCRIPTION	USCS	AASHTO
SILT, SOME CLAY AND GRAVEL, TRACE SAND.	CL	A-4(12)

Project No.: DSM ENVIRONMENTAL

Project: CORCO SITE PHASE I

Location: BORING PB-32 SAMPLE NO. 8

Date: SEPTEMBER 29, 1994

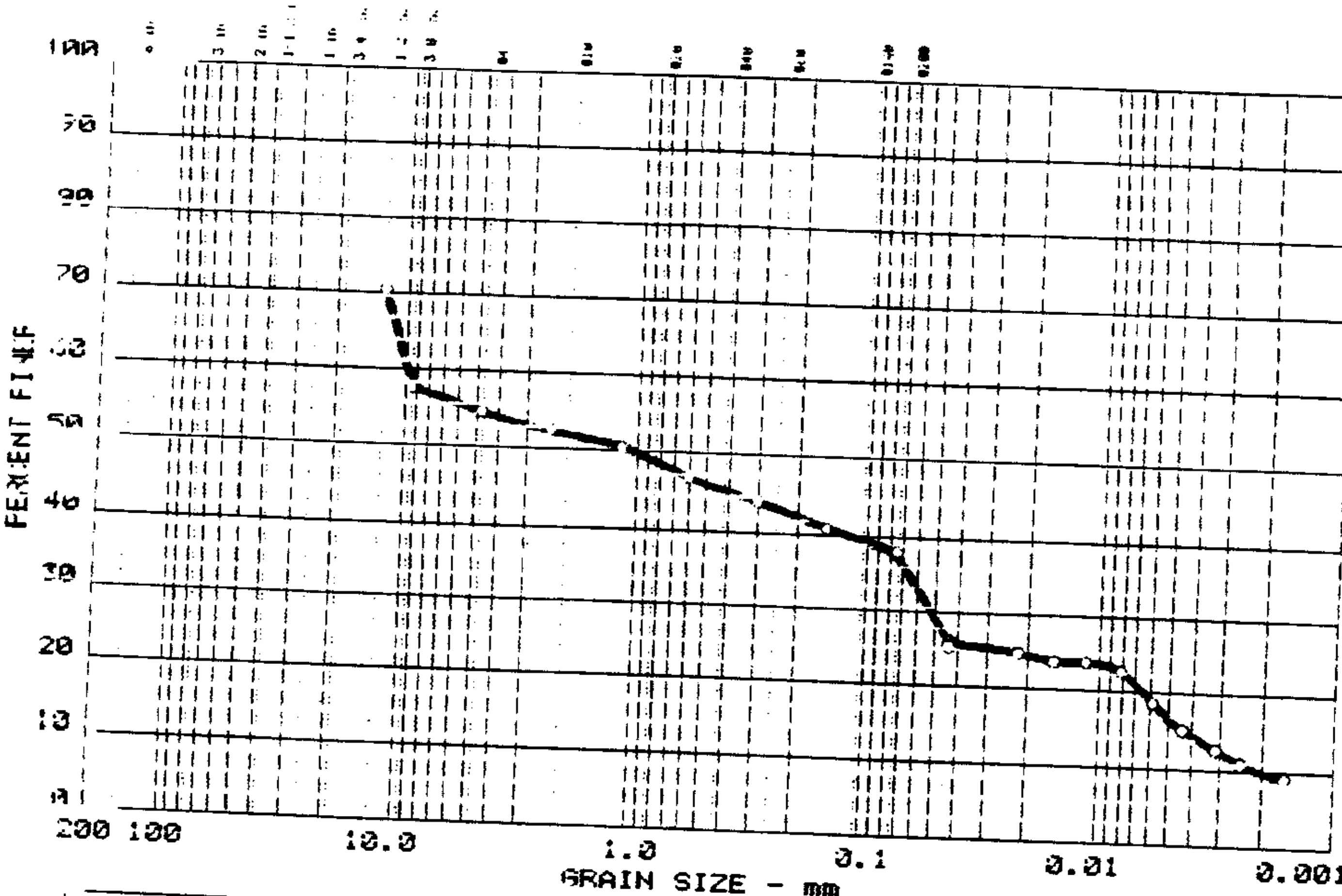
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
19	0.0	45.3	16.7	21.6	16.4

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
20.7	3.0	12.70	10.03	1.05	0.053	0.0043	0.0021	0.13	4742.4

MATERIAL DESCRIPTION	USCS	AASHTO
LIMESTONE GRAVEL, SOME SAND, SOME SILT, TRACE CLAY	GM	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-32 SAMPLE NO 22

Date: SEPTEMBER 29, 1994

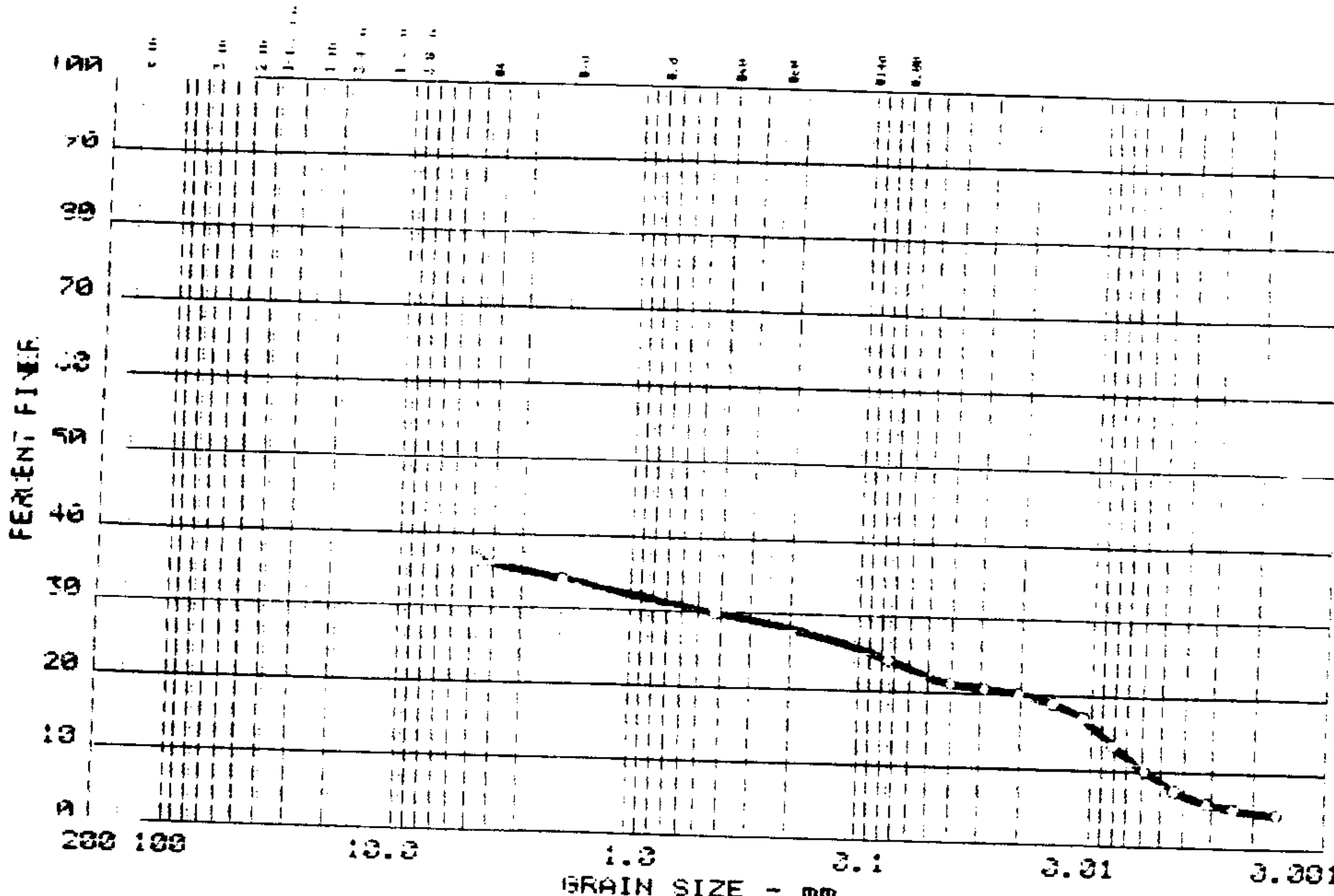
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No. 3A

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 16	0.0	63.5	12.3	15.6	8.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	21.03	2.00	4.75	4.75	4.75	0.438	0.0091	0.0058	7.00	822.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ LIMESTONE GRAVEL, SOME SAND, SOME SILT, TRACE CLAY	GM	A-1-b(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
○ Location: BORING PD-32 SAMPLE NO. 27

Date: SEPTEMBER 29, 1994

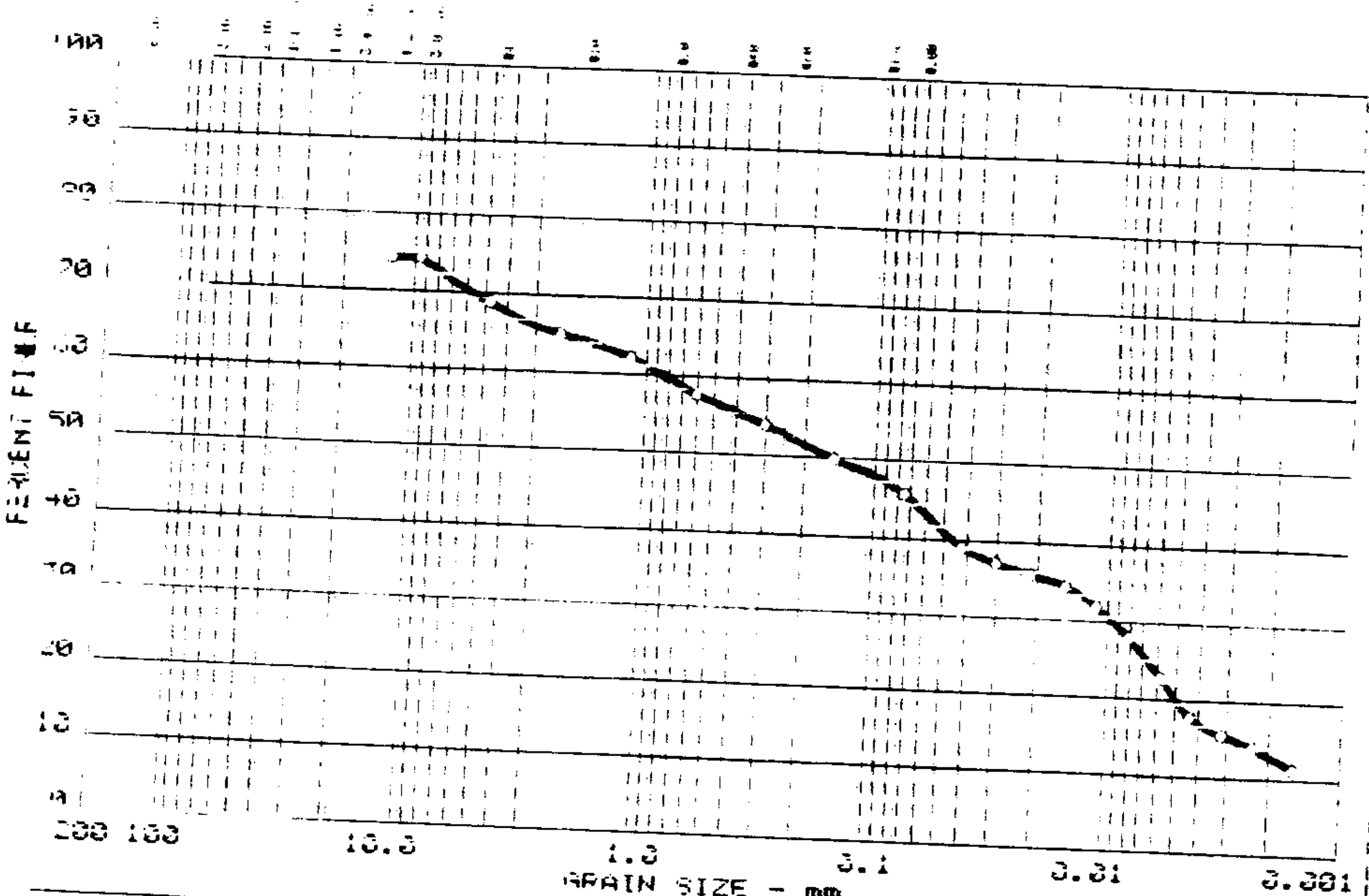
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
29	0.0	31.2	23.1	25.8	19.9

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
22.5	1.7	12.78	0.83	0.15	0.009	0.0020			

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY SANDY GRAVEL, SOME CLAY.	GM	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD 32 SAMPLE NO. 29

Date: SEPTEMBER 29, 1994

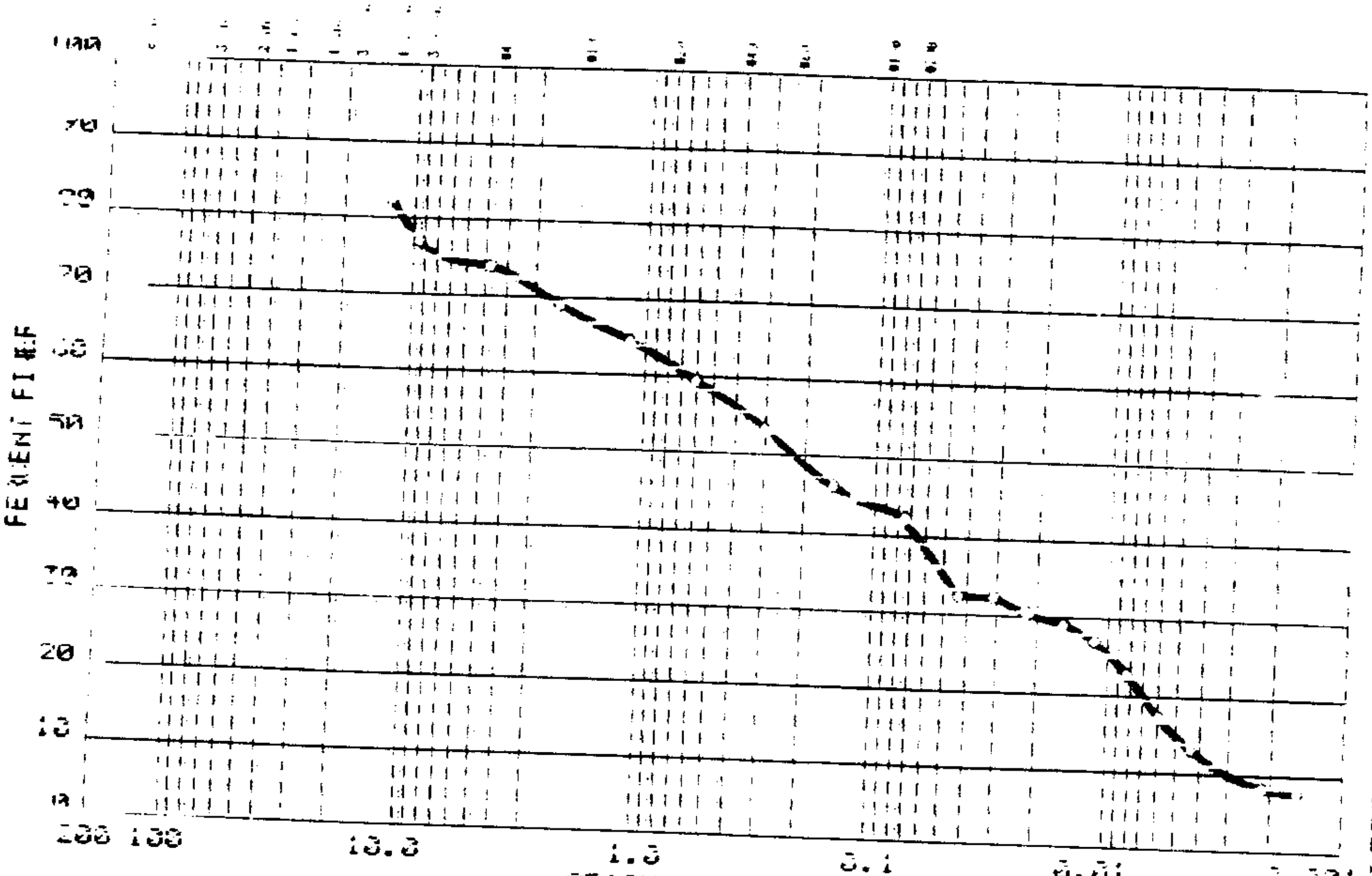
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test No.	+3"	% GRAVEL	% SAND	% SILT	% CLAY
5	0.0	26.1	31.7	27.4	14.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
24.40	3.1	12.78	0.64	0.22	0.019	0.0051	0.0030	0.28	213.0

MATERIAL DESCRIPTION	USCS	AASHTO
GRAVELLY SILTY SAND, SOME CLAY.	SM	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PB 32 SAMPLE NO. 33

Date: SEPTEMBER 29, 1994

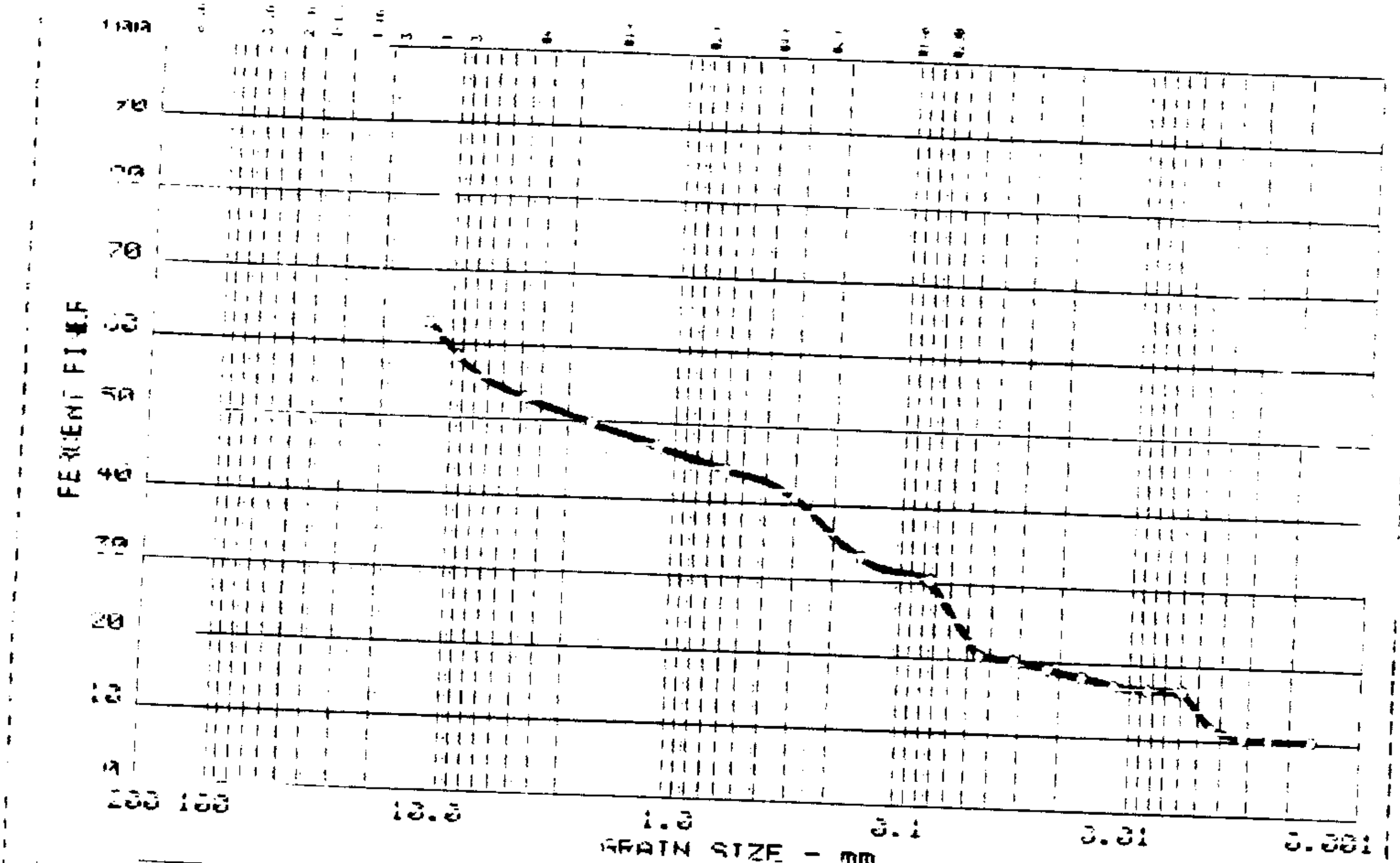
GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Remarks:

Figure No.3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
6	0.0	47.0	22.6	16.7	13.7

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
		12.73	10.50	2.30	0.073	0.0054			

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY GRAVEL, SOME SILT, SOME CLAY.	GM	A-2-4(0)

Project No.: BSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING PD-32 SAMPLE NO. 35

Date: SEPTEMBER 29, 1994

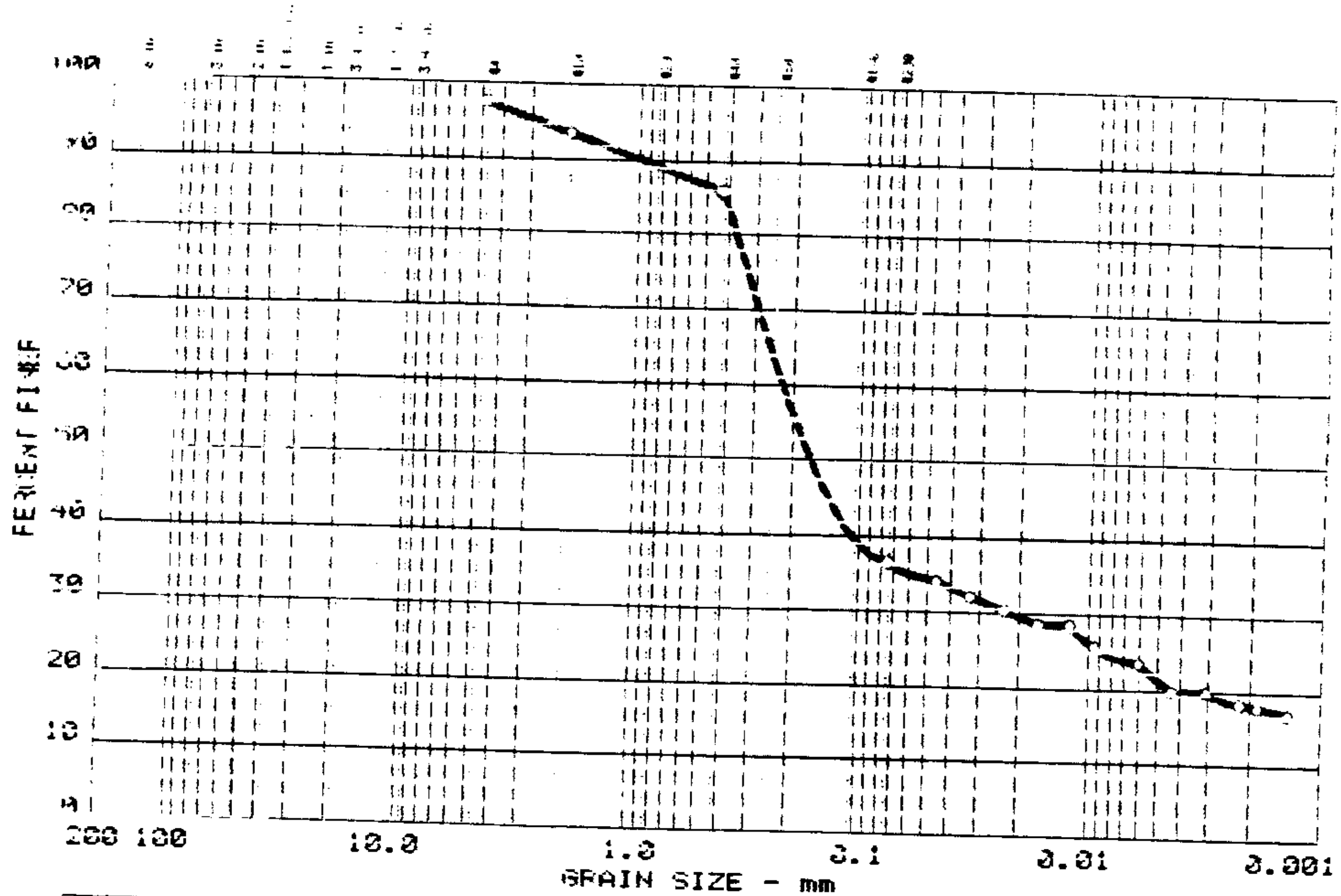
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No.7

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
1	0.0	2.6	60.8	15.2	21.4

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
		0.41	0.22	0.17	0.022				

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SAND, SOME SILT, TRACE GRAVEL.	SM	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
Location: BORING ZL-1 SAMPLE FROM 8' @ 10'

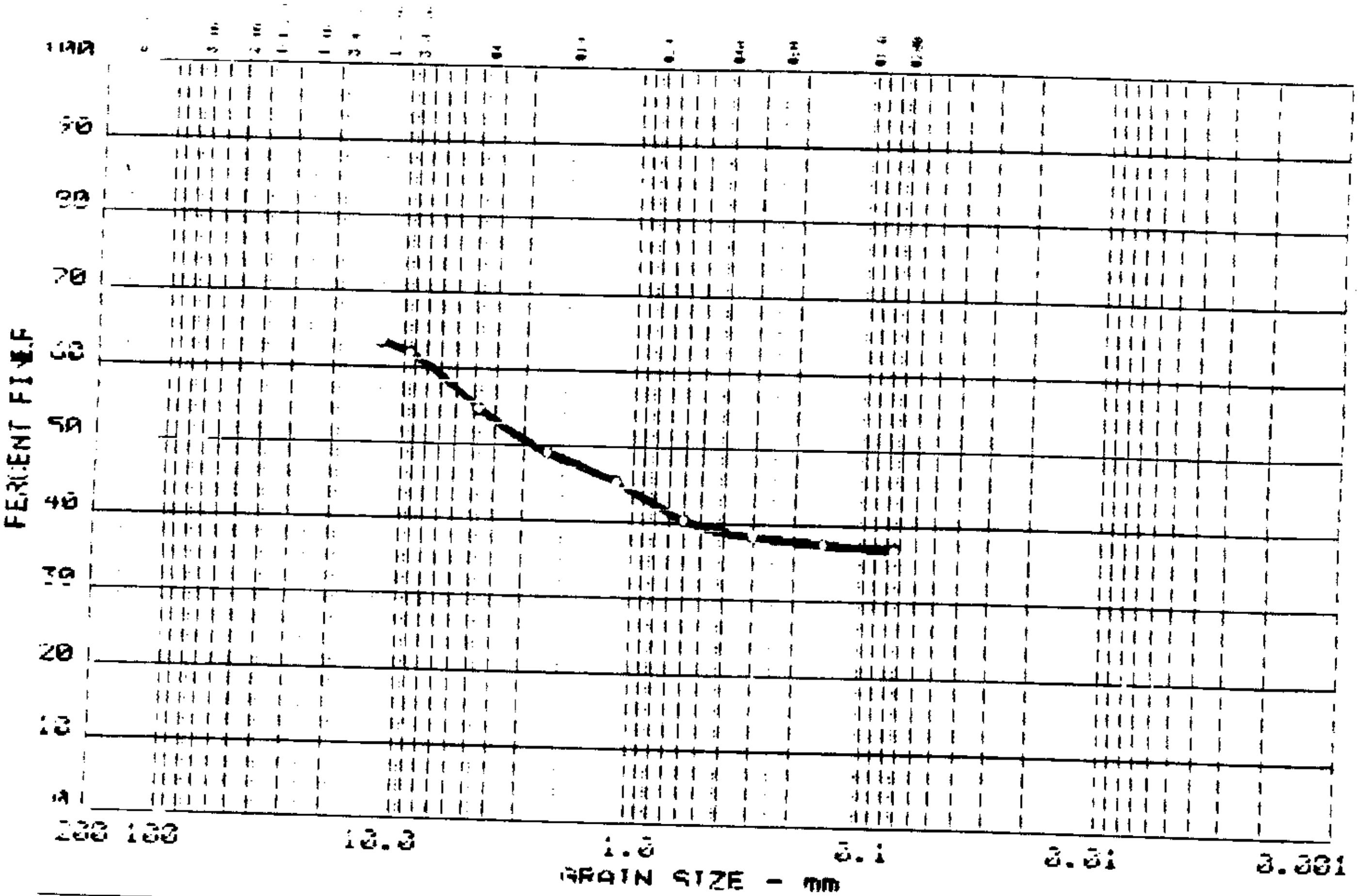
Date: SEPTEMBER 29, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
VICTOR E. RIVERA ASSOCIATES

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
2	0.0	45.2	19.0	36.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
2			12.70	7.56	2.05					

MATERIAL DESCRIPTION	USCS	AASHTO
2 SILTY GRAVEL, SOME CLAY, SOME SAND.	GM	A-4(0)

Project No.: DSM ENVIRONMENTAL
Project: CORCO SITE PHASE I
2 Location: BORING EL 1 SAMPLE FROM 14' @ 16'

Date: OCTOBER 13, 1994

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

VICTOR E. RIVERA ASSOCIATES

Figure No. 1

W E S T O N
S O I L B O R I N G L O G

Soil Bore No:	SB-01
Log By:	* PAUL LANDRY
Date Began:	7-14-89
Date Ended:	7-14-89
Total Depth:	51 feet

Site Name:	Modular Incineration Systems, Inc., CORCO Site
Subcontractor:	Victor Rivera Drilling
Operator:	Antonio Delgado
Drilling Method:	Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Borings backfilled w/ cuttings

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx G E O S C I E N C E S xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	2.0	10-16-15-14	GRAVEL (L.S) w/ silt, dry, dense, sandy i/p (0-0.5'), 30% med-fine, (0.5-2.0') Silty CLAY, red brown, mod. plastic, dry
2.0-4.0	1.2	14-10-10-10	CLAY - orange brown, dense, dry, very plastic, occasional limestone fragments, some silt 10-20%
4.0-6.0	1.8	11-10-6-11	CLAY - orange brown w/ occasional weathered white limestone fragments, plastic clay, sticky i/p, dry, some silt 15%
6.0-8.0	1.0	12-10-10-12	Silty CLAY, dry, tan-orange brown, common weathered limestone (white), 20% silt, plastic clay
8.0-10	2.0	7-14-42-32	(8.0-9.4) CLAY, orange brown w/ float. white limestone, sticky, dry, some silt 10% into crystalline limestone @ 9.4' - back into clay
14.0-16.0	2.0	5-6-8-20	(As Above) Limestone float. in a predominantly silty clay matrix (20-30% silt), occasional crumbly, often dry, mod. plastic, orange brown clay
* 19.0-21.0	1.8	3-5-6-6	Uniform orange brown CLAY with smaller limestone fragments throughout (white) clay, dense, soft, sticky, very plastic
* 24.0-26.0	1.2	3-4-8-12	(24-24.6) Orange brown CLAY, some silt 15%, dominantly sticky and plastic, occasionally crumbly, dry (24.6-27.1) abundant white weathered limestone and silt w/dry clay, non-plastic
* 29.0-31.0	2.0	5-5-6-6	Tan-white clayey SILT, crumbly, abundantly weathered white limestone, dry, chalky
34.0-36.0	1.8	6-6-6-6	Tan-off white SILT- Clayey SILT, dry, crumbly, non-plastic, occasionally weathered, chalky limestone fragments

WESTON
SOIL BORING LOG

Soil Bore No:	SB-01		
Log By:	PAUL LANDRY	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Date Began:	7-14-89	Subcontractor:	Victor Rivera Drilling
Date Ended:	7-14-89	Operator:	Antonio Delgado
Total Depth:	51 feet	Drilling Method:	Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Borings backfilled w/ cuttings

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
39.0-41.0	1.0	12-15-20-15	(39.0-39.4) tan, clayey SILT, dry, crumbly, occasional white limestone fragments, grades into (39.4-40.0') white, chalky, weathered limestone, occasionally well indurated, often chalky, decomposed limestone, soft-crumbly
44.0-46.0	1.5	23-37-63	(44-45.5) Crumbly, chalky, weathered LIMESTONE grading to competent crystalline limestone - hard, sucrosic texture, @45.5' - weathered clay bi-products - silty, dry - refusal Augered past refusal point - slow
49.0-51.0	Refusal	60/5	Refusal @ 49.0' - probably over 4.0' into bedrock

WESTON
SOIL BORING LOG

Soil Bore No:	SB-02	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-17-89	Operator:	Antonio Delgado
Date Ended:	7-17-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth:	71 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx G E O S C I E N C E S xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	2.0	12-23-19-40	Poorly sorted weathered limestone and limestone fragments, tan, cobble size, powder dry, clay size silt, poorly packed, strong HCl reaction
2.0-4.0	2.0	28-33-21-21	(2.0-2.4') - as above, tan-white i/p (v-dry) (2.4-4.0') - black-red brown, tan-brown, very dry clay and silt w/ weathered rock fragments, black portion (2.4-2.7') has slight tar odor, very dry weathered rock, strong HCl reaction
* 4.0-6.0	2.0	8-6-5-15	(4.0-5.5') - Tar stained or soaked CLAY W/ white limestone fragments, occasionally black, uniform, dense, tar odor (5.5-6.0') - tan-white red brown silty, rocky CLAY, dense, dry, slightly plastic
6.0-8.0	2.0	12-19-32-25	Silty, rocky (limestone) CLAY, mod. plastic - plastic i/p, very dry, abundantly weathered limestone fragments, 10-20% silt, dominant clay matrix, tan - yellow brown
8.0-10	2.0	10-20-18-15	As above - dominant CLAY w/ weathered limestone fragments, very dry tan- white
14.0-16.0	2.0	10-16-17-12	As above - 10-20% SILT size, poorly sorted w/ occasional dense clay lenses, limestone fragments throughout, very dry, no discernible odor, tan
* 19.0-21.0	1.3	7-7-9-9	Gray brown - gray clayey SILT w/ occasional tan clayey lenses, occasional mod. plastic, trace moisture - dry occ. moderate gray brown, trace white rock fragments of weathered limestone, appears undisturbed
* 24.0-26.0	2.0	7-15-16-17	Silty CLAY - CLAY SILT i/p tan - light brown - off white, mod. plastic i/p very dry, abundant weathered limestone fragments

WESTON
SOIL BORING LOG

Soil Bore No: *	SB-02	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-17-89	Operator:	Antonio Delgado
Date Ended:	7-17-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth:	71 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

G E O S C I E N C E S

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
29.0-31.0	-	20-25-28-37	SILTY, rocky CLAY, red brown-tan-white, weathered limestone in silty clay matrix, occasional plastic and dense, often rocky, dry, crumbly i/p dense, clay percentage is red brown and plastic, occasionally sticky
34.0-36.0	1.0	37-55/5"	Uniform yellow brown clay w/ minor weathered limestone bi-products (not in bedrock)
39.0-41.0	1.0	31-55/5"	Alternate light brown-tan clay and decomposed limestone w/occ. cobble limestone - DRY
44.0-45.0	1.0	26-62 Refusal	Dense orange-red brown CLAY w/ limestone fragments white-tan-sucrosic, crystalline, hard i/p
49.0-50.0	1.0	60-100	Red brown-orange red CLAY w/ crumbly weathered limestone fragments, clay is dry, plastic, gummy i/p
54.0-56.0	2.0	24-20-45-33	As above, orange brown-red brown CLAY w/ crystalline-gritty textured limestone fragments white, completely weathered to gray-tan clay i/p
59.0-61.0	2.0	18-28-42-28	CLAY, red brown-orange brown, dense, plastic-v. plastic, dry, little limestone, consistent, uniform, well packed
64.0-66.0	-	11-25-72-100	(Top 1.3') CLAY, as above (Bottom 0.7') Rubble limestone
69.0-71.0	-	80-59-64-72	(Top 0.4') weathered limestone and CLAY, tan-orange (bottom 1.6') crushed limestone crumbly, slightly weathered, hammer blows crushed chalky limestone into crumbly rock fragments

WESTON
SOIL BORING LOG

Soil Bore No: *	SB-03	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-18-89	Operator:	Antonio Delgado
Date Ended:	7-18-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth:	41 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	0.9	33-27-30-30	Poorly sorted fill- white tan gravel, cobbles - silt and powdery clay, v. dry, weathered limestone fragments
2.0-4.0	1.2	32-25-25-28	CLAY, silty, v. dry, tan-off white, crumbly, poorly packed, non plastic, wide range of white limestone fragments
4.0-6.0	1.8	17-23-23-21	SILT, clayey, gravelly, very poorly sorted, very dry, weathered limestone as above
6.0-8.0	2.0	15-17-19-13	SILT, clay tan-white w/limestone fragments, very dry as above, crumbly, becomes red brown plastic clay from 7.7-8.0
8.0-10	2.0	18-23-16-18	Weathered LIMESTONE fragments w/clay, orange, silty matrix, poorly sorted white-tan
* 14.0-16.0	2.0	11-12-10-19	CLAY, orange brown with white friable limestone fragments, very dry, silty 15-20%, moderately plastic i/p
* 19.0-21.0	2.0	13-28-22-20	CLAY w/silt and gravel, LIMESTONE fragments, v. dry, crumbly, poorly sorted and packed, non plastic
24.0-26.0	1.6	10-12-10-8	Dominant LIMESTONE gravel w/crumbly dry silt and clay, mostly weathered friable limestone, white-tan
29.0-31.0	2.0	20-28-24-31	As above - poorly sorted, SILT, CLAY, gravel limestone fragments very dry and crumbly
34.0-36.0	1.7	47-80-76 100/5"	Uniform white LIMESTONE, friable, indurated and crushed i/p by split spoon, suspect bedrock
39.0-41.0	2.0	39-31-57-32	As above uniform crushed LIMESTONE - T.D.

WESTON
SOIL BORING LOG

Soil Bore No: *	SB-04		
Log By:	PAUL LANDRY	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Date Began:	7-18-89	Subcontractor:	Victor Rivera Drilling
Date Ended:	7-18-89	Operator:	Antonio Delgado
Total Depth:	56 feet	Drilling Method:	Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring used as pilot hole for drilling well MW-04

GEOSCIENCES

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	2.0	5-13-35-24	Poorly sorted CLAY - GRAVEL sized, limestone fragments, very dry, tan-off white, weathered limestone
2.0-4.0	2.0	18-35-40-32	As above, very dry and crumbly, calcareous
4.0-6.0	-	23-26-20-21	as above LIMESTONE and crushed poorly sorted, calcareous
6.0-8.0	2.0	27-20-22-21	Top 0.3' as above
	2.0	15-17-19-13	Bottom 1.7' orange brown, silty CLAY w/ abundant white limestone fragments, very dry, clay, moderately plastic i/p, dominantly crumbly and dehydrated, occasionally with weathered limestone, calcareous
8.0-10	2.0	12-18-34-24	Decomposed, weathered limestone, clayey, occasionally plastic, orange-red brown i/p, occasionally indurated, silty 10%, crumbly, weathered tan-white limestone, very dry, britt.e-friable, calcareous
14.0-16.0	2.0	10-20-18-21	Soils weathered from limestone, clayey texture w/ limestone fragments, v. calcareous, strong HCl reaction, plastic- friable i/p, silty
* 19.0-21.0	2.0	11-17-22-29	Heavily weathered soils from limestone, young soils but non-indurated - in transition from rock soils, clay-silt-sand-cobble sized gradations, poorly sorted, tan-white, calcareous
24.0-26.0	1.5	14-14-23-42	As above, CLAY, with limestone fragments, weathering of limeston to soil, very dry
29.0-31.0	1.6	11-14-14-17	As above, very dry
34.0-36.0	1.5	23-17-17-20	Poorly sorted clays-silt-sand silt-gravel-limestone fragments, occasionally hard, crumbly, v. calcareous, very dry

WESTON

SOIL BORING LOG

Soil Bore No: *	SB-04	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-18-89	Operator:	Antonio Delgado
Date Ended:	7-18-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth:	56 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet

* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring used as pilot hole for drilling well MW-04

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
39.0-41.0	2.0	23-19-30-26	As above, very dry, clay-silt-sand-gravel
44.0-46.0	1.6	15-25-17-15	Clay-gravel-silt-sand sized mixture-poorly sorted-Dominant limestone weatheredto wide range of friable indurated bi-products, very dry
* 49.0-51.0	-	8-7-7-8	Change in lithology, light brown, yellow brown, less LIMESTONE fragments, crumbly soils, very dry, clayey silts w/ some white limestone fragments
* 54.0-56.0	-	56-55-30-106	All crushed LIMESTONE, white-tan buff, no soils or evidence of weathering

WESTON
SOIL BORING LOG

Soil Bore No:	SB-05	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-19-89	Operator:	Antonio Delgado
Date Ended:	7-19-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth:	51 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring used as pilot hole for drilling well MW-05

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	1.1	7-14-31-23	LIMESTONE GRAVEL mixture, poorly sorted, dry, tan-white, size range from pebble-cobble-clay powder
2.0-4.0	1.7	30-38-52-80	Orange brown silty clay soil with limestone fragments, common, very dry, powdery i/p, packed portion of silty clay has mod-rate plasticity, white weathered limestone
4.0-6.0	-	14-20-21-18	Silty CLAY w/ limestone fragments throughout, very dry, clay, occasionally mod. plastic, often crumbly and dehydrated
6.0-8.0	-	21-18-29-18	As above very dry
8.0-10.0	-	34-59-22-20	Mainly limestone, and crushed rock, silt and clay only minor
* 14.0-16.0	-	15-24-17-16	Silty CLAY- red brown-orange, occ. limestone fragments, dry, moderately plastic i/p, silty 20%
* 19.0-21.0	1.5	8-10-18-17	Silty CLAY, orange brown, tan limestone fragments common, very weathered, white, light tan
* 24.0-26.0	1.6	11-27-24-25	Silty CLAY, red brown - orange (mixed w/ white limestone), clay is dry, moderately plastic, dense i/p, limestone is tan-white-chalky - occasionally well indurated, strong HCl reaction.
* 29.0-31.0	-	19-14-8-16	Silty CLAY, yellow brown w/ fossiliferous limestone fragments, tan-white, clay is slightly plastic, very dry, occasionally crumbly
34.0-36.0	-	17-20-28-42	CLAY, silt decreasing, increasing weathered limestone silt, yellow-brown-gray (light), crumbly, abundant weathered lime-stone, v. calcareous, fossiliferous i/p, friable-hard
39.0-41.0	-	26-34-32-29	Dominantly gravel, cobble sized limestone, w/ clayey silt matrix, very dry, crumbly, weathered limestone-tan-white, hard i/p
44.0-46.0	1.7	11-17-16-18	Chalky limestone weathered in place, crushed w/ fingers into clay size powder, maybe top of bedrock where weathering is beginning to convert to soil, no orange clay silt
49.0-51.0	-	25-88-117/6"	Crushed limestone, no soil present - T.D.

WESTON

SOIL BORING LOG

Soil Bore No:	SB-06	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-19-89	Operator:	Antonio Delgado
Date Ended:	7-20-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth:	* 44.1 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring used as pilot hole for drilling well MW-06

GEOSCIENCES

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	1.2	17-29-20-35	Poorly sorted LIMESTONE GRAVEL, powdery clay to cobble sized limestone fragments, very dry
* 2.0-4.0	1.7	36-36-19-28	Top 0.5' as above into bottom (1.2) silty clay w/ abundant poorly sorted limestone fragments, crumbly, moderately plastic and dense, very dry, weathered limestone bi-products
* 4.0-6.0	1.1	14-13-12-17	Poorly sorted clay silt and wide gradations of weathered and resistant limestone fragments, very dry
6.0-8.0	1.6	62-47-54-78	Crushed tan-off white limestone, no visible soils - dry
8.0-10.0	2.0	36-42-39-44	Crushed white - tan limestone, no soils present
14.0-15.5	-	45-73-64	Mixture of red brown clay w/ weathered limestone- white
* 19.0-21.0	1.8	9-12-11-16	CLAY, orange brown-yellow brown, dense, plastic 20/10% silt, occasional limestone fragments, very dry
* 24.0-26.0	-	18-14-43-34	Dominant limestone, white-hard-crumbly, weathered i/p, clay, orange red as above in 20% of sample, very dry chalky - occasionally well indurated, strong HCl reaction.
* 29.0-31.0	1.7	7-13-13-15	CLAY, dense, uniform, orange brown, plastic, very dry - dry, little limestone, trace fragments, dominantly uniform, well packed clay
34.0-36.0	1.5	17-28-31-71	CLAY, silty, yellow brown, less orange, more limestone fragments very dry, moderately plastic, crumbly i/p, some orange-red brown clay lenses
39.0-41.0	2.0	26-36-46-72	Top 1.55', red brown clay w/ weathered limestone Bottom 0.45' limestone, white hard, brittle and chalky
44.0-44.1	-	100/2"	LIMESTONE - spoon refusal

W E S T O N
S O I L   B O R I N G   L O G

Soil Bore No:	SB-07	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-20-89	Operator:	Antonio Delgado
Date Ended:	7-20-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth: *	50 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx G E O S C I E N C E S xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	1.8	5-14-29-21	Gravel-cobbles-silt-clay, very poorly sorted, powdery rubble well indurated, limestone rubble, dry, white tan
2.0-4.0	2.0	17-19-19-18	Top 0.6 as above Bottom 1.4 yellow orange silty CLAY with occasional limestone fragments, very dry, moderately well packed, slightly plastic, very calcareous
4.0-6.0	1.7	13-15-16-25	Gravel mix, poorly sorted w/ silty clay, high % of gravel, fill, very dry, poorly packed, less soil, all very calcareous
6.0-8.0	-	16-16-16-15	Clayey SILT, yellow brown, graded to silty clay i/p, common limestone fragments, very dry, crumbly
8.0-10.0	-	16-16-35-31	Silty CLAY, yellow brown- red brown i/p, common white limestone as above, very dry, limestone-hard, chalky, weathered, white-tan
14.0-16.0	1.3	12-17-14-14	As above, rocky limestone, clay silt, crumbly, dry, moderately-poorly packed
19.0-21.0	1.3	13-28-25-19	Crumbly weathered limestone and clayey silt, moderately well packed, very dry, w/ common gradations to hard-crumbly limestone
* 24.0-26.0	2.0	12-18-22-24	Chalky limestone, crushed to powder interbedded w/ red brown clay, very plastic, all very dry
* 29.0-31.0	2.0	25-39-38-43	Weathered Limestone, and orange clay, chalky, plastic, moderately well packed, very dry
* 34.0-36.0	-	15-32-35-57	As above, dense orange brown clay w/ tan-white limestone, hard chalky, friable, dry
	-	28-60 100/3"	As above, into bottom 0.3'- crushed limestone powder
44-44.8	-	60-50/2"	Friable - densely plastic, weathered limestone to clay orange limestone (weathered), tan white soft
49.0-50.0	-	85-100/4"	Clay, orange brown in top 0.3' bottom 0.7' crushed limestone, dry, powdery, no soil evident

WESTON
SOIL BORING LOG

Soil Bore No: SB-08
Log By: PAUL LANDRY
Date Began: 7-21-89
Date Ended: 7-21-89
Total Depth: 60.63 feet

Site Name: Modular Incineration Systems, Inc., CORCO Site
Subcontractor: Victor Rivera Drilling
Operator: Antonio Delgado
Drilling Method: Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	1.4	10-19-23-23	Top 0.3' - gravel, silt and clay- dry, poorly sorted Bottom 1.1' - moderately packed, clayey silt, w/common weathered limestone, white-silt orange brown light-tan
2.0-4.0	1.6	26-24-31-30	As above, moderately packed clayey SILT, very dry, occasionally hard, crumbly limestone, tan, light yellow brown-white
4.0-6.0	-	10-14-19-22	As above w/ higher gravelly limestone fragments included, poorly sorted, less packed, very dry
6.0-8.0	1.4	51-31-27-29	Flakey tan-buff crystalline limestone grades into crushed lime and into clayey silt as above at 6.7 feet dry with common weathered limestone.
8.0-10.0	1.6	20-16-16-18	As above, very dry crumbly, silt with clay limestone fragments.
14.0-16.0	1.7	16-17-20-66	As above, poorly sorted clayey silt with common hard crumbly limestone in different stage of weathering, very dry- Yellow brown-occasionally red brown soils
19.0-21.0	1.6	11-21-21-24	Tan clayey silt. As above poorly sorted mixture of clayey silt and limestone (white) very dry, hard- crumbly weathered limestone
24.0-26.0	2.0	30-56-18-25	As above, rocky in middle of spoon, limestone fragments hard.
29.0-31.0	1.8	15-32-32-49	AS above with high percentage of limestone fragments.
34.0-36.0	2.0	18-19-21-23	AS above clayey silt- silty clay with 40% weathered hard limestone
39.0-41.0	-	9-15-15-12	Clay with large limestone fragments, dense orange brown, moderately plastic, dry

W E S T O N
S O I L   B O R I N G   L O G

Soil Bore No: SB-08
Log By: PAUL LANDRY
Date Began: 7-21-89
Date Ended: 7-21-89
Total Depth: 60.63 feet

Site Name: Modular Incineration Systems, Inc., CORCO Site
Subcontractor: Victor Rivera Drilling
Operator: Antonio Delgado
Drilling Method: Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
44.0-46.0	2.0	9-27-28-10	Top 0.8'- yellow brown clayey silt as above with common limestone fragments throughout Bottom 1.2' - moderate dense orange brown clay, some limestone fragments, moderately plastic, dry, white weathered limestone inclusions
* 49.0-51.0	-	7-8-9-9	Dark brown clayey silt with red brown lime inclusions and very coarse grained rock fragments, no noticable odor, first occur-occurence of this lithology change yet on site. Very dark brown moderately well packed silt, dry.
* 51.0-53.0	-	9-12-13-15	As above , very dark brown with tan-red brown limestone incl-usions, very calcareous, clay, plastic almost black slight mildew odor
53.0-55.0	-	17-17-19-12	From 51-52.5 as above- into light orange- yellow brown silty clay with limestone inclusions, plastic,crumbly very dry.
59.0-59.6	0.5	35-70/1	Silty clay orange-yellow brown-white- consistent clay, some hard crystalline limestone dips at base.
59.6-60.08	-	152	Crushed limestone - white with some very hard tan crystalline and some crumbly weathered clay.
60.08-60.63	-	250	As above

WESTON

SOIL BORING LOG

Soil Bore No: SB-09
Log By: PAUL LANDRY
Date Began: 7-22-89
Date Ended: 7-22-89
Total Depth: 46.0 feet

Site Name: Modular Incineration Systems, Inc., CORCO Site
Subcontractor: Victor Rivera Drilling
Operator: Antonio Delgado
Drilling Method: Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	1.80	3-17-21-27	Top 0.6' light brown soil, silty with limestone gravel in part. Bottom 1.2' predominantly white lime, gravel, and dry poorly packed silt.
2.0-4.0	2.0	23-22-14-20	SILT yellow brown, some clay, common lime fragments,dry,moderately well packed, crumbly Bottom 0.3' - gray brown-gray silt
4.0-6.0	1.20	9-27-33-55	SILT, gray-gray brown-yellow brown clayey SILT with common limestone fragments, dry, crumbly- moderatly well packed.
6.0-8.0	2.0	53-44-35-42	Top 1.20'- silt as above with limestone fragments and clay. Bottom 0.6' orange brown-yellow brown clay, plastic well packed dense, dry with limestone.
8.0-10.0	-	15-16-21-26	Clayey SILT, yellow brown, crumbly, common limestone fragments, dry, grades into limestone gravel (fill).
14.0-16.0	1.80	4-5-8-14	SILT, medium-dark gray-yellow brown with depth , clayey, limestone gravel (white) at bottom 0.3'
16.0-18.0	-	19-14-19-14	Crushed white limestone with gravel and weathered limestone, some clay and silt, dry, crumbly
19.0-21.0	-	4-6-12-25	CLAY, orange brown-yellow, silty in part, crumbly, occasional limestone fragments, hard, weathered and crumbly, clay - slightly plastic in part
24.0-26.0	-	11-30-43-55	Clay and weathered limestone, limestone weathered to white clay and powder, moderately packed as above
29.0-31.0	-	21-33-47-79	Clay and weathered limestone, white and orange, red brown - mixed with clay

WESTON
SOIL BORING LOG

Soil Bore No:	SB-09	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	PAUL LANDRY	Subcontractor:	Victor Rivera Drilling
Date Began:	7-22-89	Operator:	Antonio Delgado
Date Ended:	7-22-89	Drilling Method:	Hollow Stem Auger - Split Spoon
Total Depth:	46.0 feet		

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

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Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
* 34.0-36.0	-	15-14-19-22	CLAY, orange brown, dense, very plastic, dry, little silt or limestone, very dense, uniform
* 39.0-41.0	1.40	33-97-70-103/4"	CLAY, red brown, orange, dense, dry, little limestone fragments, some trace silt
44.0-46.0	1.7	22-34-60-106	Weathered limestone into hard white limestone, crushed to powder parts, bottom 1/3 of spoon is hard

WESTON
SOIL BORING LOG

Soil Bore No:	SB-10		
Log By:	PAUL LANDRY	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Date Began:	7-24-89	Subcontractor:	Victor Rivera Drilling
Date Ended:	7-24-89	Operator:	Antonio Delgado
Total Depth:	61.0 feet	Drilling Method:	Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
+ - Sampled for VOA's only
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

GEOSCIENCES

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
0-2.0	1.1	10-9-9-11	Loosely packed gravel fill with clay and silt sized dry powder matrix, very poorly sorted, tan - white
2.0-4.0	1.5	12-17-30-16	Top 1.2'- as above, becoming more compacted, occasional orange brown clayey silt Bottom 0.3' - black stained packed clayey silt and limestone fragments, slight tar odor
+ 4.0-6.0	2.0	71-35-29-30	Top 0.5' - black, silty CLAY, stained uniform black, strong tar/petrol odor, soft, moderately plastic, dry Bottom 1.5' - orange silty CLAY, with abundant white limestone fragments, dry, moderately plastic
6.0-8.0	2.0	30-30-17-20	Clayey SILT, with abundant limestone fragments (white), tan-orange-yellow brown mixture, very dry
8.0-10.0	1.6	12-13-17-17	CLAY, silty, rocky limestone, white, yellow-light orange brown dry, crumbly, moderately plastic in parts, abundant weathered limestone
14.0-16.0	2.0	15-16-17-20	CLAY, silty, orange brown-yellow brown, white limestone fragments, abundant, weathered, hard in part, crystalline, chalky, soils, very dry, crumbly, plastic in part
19.0-21.0	1.9	8-12-9-6	As above, silty clay, orange, yellow brown, with abundant, weathered limestone fragments, hard, soft, dry, plastic clay
21.0-23.0	1.0	9-9-7-5	
24.0-26.0	1.7	11-7-5-13	CLAY, with limestone fragments, hard, weathered crumbly white, clay is orange brown, very plastic from 1.0-1.7 portion of sample, some crumbly, silty yellow brown clay and limestone on top %

WESTON
SOIL BORING LOG

Soil Bore No: SB-10
Log By: PAUL LANDRY
Date Began: 7-24-89
Date Ended: 7-24-89
Total Depth: 61.0 feet

Site Name: Modular Incineration Systems, Inc., CORCO Site
Subcontractor: Victor Rivera Drilling
Operator: Antonio Delgado
Drilling Method: Hollow Stem Auger - Split Spoon

Comments: Continuous split spoon sampling from 0-10.0', followed by one sample every subsequent 5.0' feet
+ - Sampled for VOA's only
* - Indicates composite sample collected over these depths for chemical analyses

Well Completion: Soil Boring backfilled with cuttings

GEOSCIENCES

Depth Interval (Feet)	Recovery (Feet)	Blow Counts	General Description
29.0-31.0	1.2	4-4-8-9	CLAY, orange brown, less limestone fragments, red brown in part, very plastic, dry - damp in part, common limestone fragments hard, crumbly and weathered
34.0-36.0	0.3	8-9-10-10	CLAY - very plastic, orange brown, with large cobble at base prevented good sample recovery
* 36.0-38.0	-	8-9-6-14	CLAY, (rocky limestone), gray, green-orange brown in part, very plastic, crystalline, limestone fragments in part, very plastic
* 39.0-41.0	-	10-7-8-11	CLAY - gray green-orange brown in part, common crystalline limestone fragments, gravel size pebbles, weathered soil, clay, moderately plastic
* 44.0-46.0	2.0	10-10-6-12	Top 1.1', as above gray green-gray silty clay with limestone Bottom 0.9', dark gray-black silty clay, moderately plastic
49.0-51.0	-	5-10-9-12	Top 0.7', as above, noticeable odor, dark brown clayey silt Bottom 1.3', poorly sorted orange white and brown silt and limestone
54.0-56.0	2.0	8-9-10-18	Silty clay-clayey silt, orange brown-yellow-white with abundant weathered limestone, occasionally crystalline and hard, all very dry
59.0-61.0	2.0	23-104-150/4"	Top 0.6', as above Bottom 1.4', into white weathered limestone, crumbled to powdery clay, white-tan, occasionally hard, crystalline - T.D.

WESTON

MONITOR WELL LOG

Monitor Well No: MW-01
Log By: Paul Landry
Date Began: 7-2-89
Date Ended: 8-7-89
Total Depth> 283 feet

Site Name: Modular Incineration Systems, Inc., CORCO Site
Subcontractor: Caribbean Well and Pump Services
Operator: Ernest Eaves
Drilling Method: Air Rotary

Comments: 7.5" Tiger Tooth bit (0 - 68')
5 7/8" Tri-cone Roller bit (68.0-283.0')

Well Completion: Refer to MW-01 well completion diagram

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx G E O S C I E N C E S xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Water Entry Depth	General Description
0 - 49		Poorly sorted gravel, silts and clays, dry, limestone fragments common, yellow brown - orange brown Refer to SB-01 log for detailed description of overburden soils
49 - 52		Harder drilling, tan-white limestone (strong HCl reaction), fossiliferous, hard - brittle
52 - 58		Drilling easier, lithology as above - limestone
58 - 66		LIMESTONE, tan white-yellow brown, hard, occasionally brittle, fossiliferous in part
66 - 68		As above
69 - 70.5		Dark gray-medium gray calcareous sand, med-fine grained, argillaceous in part (dark gray)
70.5 - 72.5		Medium tan, white, orange brown, crystalline limestone as above
72.5 - 73		CLAY, orange brown, gummy, calcareous, gray green in part, common weathered limestone fragments included
75 - 118.5		CLAY, gummy, plastic, calcareous, tan-green gray interbedded with fossiliferous, tan, friable, limestone
118.5 - 135		LIMESTONE, tan-white, highly fossiliferous, friable, hard, vuggy, interbedded with clay, easy fast drilling, gummy, tan, calcareous, soft
150 - 177		LIMESTONE, tan-white, fossiliferous, with clay laminations and infilling in vugs, % clay is gummy-sticky, and soft when mixed with drill water, no visible water
175 - 202		LIMESTONE, tan white, moderately hard, occasionally friable and brittle vugs common, strong HCl reaction, very fossiliferous, clay filling in vugs common, no visible water
202 - 210		LIMESTONE, as above, tan-white, yellow brown, vuggy, fossiliferous, hard brittle in part, abundant, clay returns, gummy, sticky, hydrated by drill water
210 - 252		LIMESTONE, tan-white, yellow-brown, hard, brittle, fossiliferous, vuggy in part, very calcareous, strong HCl reaction, common clay infilling
252 - 262		Lithology as above

WESTON

MONITOR WELL LOG

Monitor Well No: MW-01
Log By: Paul Landry
Date Began: 7-2-89
Date Ended: 8-7-89
Total Depth: 283 feet

Site Name: Modular Incineration Systems, Inc., CORCO Site
Subcontractor: Caribbean Well and Pump Services
Operator: Ernest Eaves
Drilling Method: Air Rotary

Comments: 7.5" Tiger Tooth bit (0 - 68')
5 7/8" Tri-cone Roller bit (68.0-283.0')

Well Completion: Refer to MW-01 well completion diagram

GEOSCIENCES

Depth Interval (Feet)	Water Entry Depth	General Description
262 - 283	Water at: - 262-266'/ 10 gpm - 273'	Lithology change from 262', gray green clay and rock, limestone, clastic, water returns at approximately 10 gpm from 262-266 feet, LIMESTONE, gray-blue gray-off white, clastic, poorly sorted, vuggy, strong HCl reaction, friable, brittle

WESTON

WELL COMPLETION SUMMARY

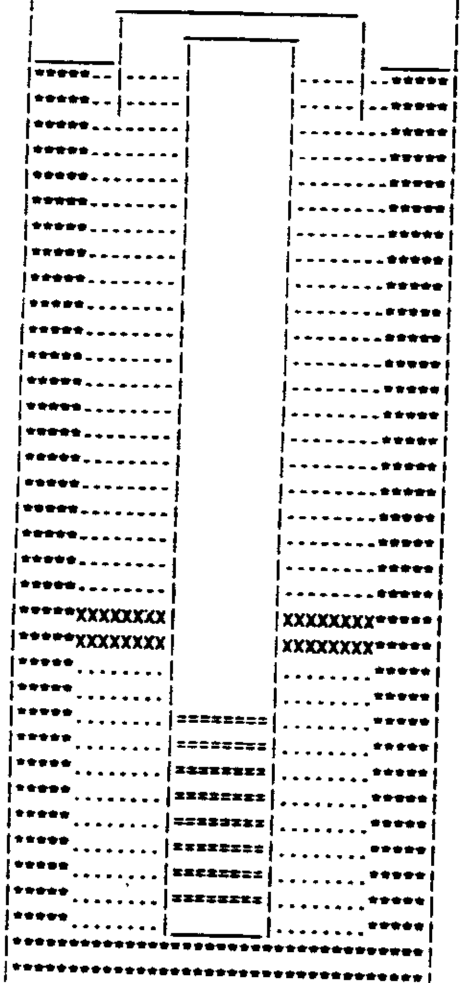
PROJECT : M.I.S. Inc.
PROJECT NO.: 3459-01-03
CLIENT : Prudential-Bache

CONTRACTOR : WESTON
DRILLING FIRM: Caribbean Well and Pump Service
INSPECTOR : Paul Landry

WELL ID No. : MW-01
COMPLETION DATE: 8-7-89
LOCATION : CORCO Site, Puerto Rico

ELEVATION
GROUND LEVEL : Surveyors data pending
TOP OF CASING: Surveyors data pending

DEPTH TO WATER (TOC): 209.55 Feet



DEPTH [FT]	
0	GS
248	BN
251	SP
263	SC
283	TD

DRILLING SUMMARY

Total Depth : 283.0 feet
Borehole Diameter: 7.5"
Driller : Ernest Eaves
Rig Type : Air-rotary
Drilling Fluid : NA

WELL DESIGN CONSTRUCTION

Outer Casing : Low Carbon Steel

PVC Riser : 200 feet

Stick-up : 1.23 feet
Protective Casing 1.95 feet

Screen Type : Sch. 80/0.10 slot
Screen Material : Stainless Steel
Screened Interval : 263 - 283 feet
Screen/Slot Size : 0.010"
Screen Riser Diam.: 2" PVC/Sch. 80

Grout/Backfill : 248 feet

Seal : Bentonite

Sand Pack : 32 feet

WELL DEVELOPMENT

Date : 8-7-89
Method : Bailed
Duration/Rate : NA

COMMENTS

GS = GROUND SURFACE
BN = BENTONITE SEAL
SP = SAND PACK
SC = SCREEN
TD = TOTAL DEPTH
--------- = GROUT
XXXXXXXXX = SEAL
.... = SAND PACK
********* = NATURAL MATERIAL

ADDITIONAL COMMENTS:
204.23 feet of PVC riser
60 feet of stainless steel riser
20 feet of stainless steel screen

WESTON

MONITOR WELL LOG

Monitor Well No:	MW-02		
Log By:	Paul Landry	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Date Began:	8-3-89	Subcontractor:	Caribbean Well and Pump Services
Date Ended:	8-9-89	Operator:	Ernest Eaves
Total Depth:	217 feet	Drilling Method:	Cable Tool

Comments: 6.0" diameter cable tool bit

Well Completion: Refer to MW-02 well completion diagram

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx GEOSCIENCES xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Water Entry Depth	General Description
0 - 71		Black tar stained soil from 2-4 feet. Refer to SB-02 log for detailed description of overburden soils
70 - 80		LIMESTONE, yellow brown, tan, white, hard, vuggy in parts, occasional fossiliferous, very calcareous, occasionally brittle
80 - 90		LIMESTONE, as above, tan-yellow brown, white, moderately hard
90 - 110		LIMESTONE, yellow brown - occasionally white, tan, dominantly fossiliferous, vuggy, hard, brittle, traces of densely crystalline marble-like texture
110 - 120		LIMESTONE, as above
120 - 140		LIMESTONE, as above, fossiliferous
140 - 150		LIMESTONE, yellow-tan-white, trace pink, black and orange, dominantly vuggy, fossiliferous, occasionally dense, crystalline, hard, occasionally brittle
150 - 160		LIMESTONE, as above, yellow brown, white-tan, vuggy, hard-brittle, fossiliferous, trace shells
160 - 180		LIMESTONE, yellow-brown-white, vuggy, very calcareous, friable-moderate hard in part, occasionally densely crystalline, white milky veins
180 - 190		As above, LIMESTONE, yellow brown
190 - 200	Water at: 195-200'	LIMESTONE, gray, green-gray, friable, very fossiliferous, increasingly vuggy, more than above, shells common, water in with lithology change
200 - 217		LIMESTONE, light gray-green gray-white, very fossiliferous, friable occasionally clastic shell fragments in friable cement matrix, occasionally dark brown fragments, highly calcareous with 10% HCl reaction

WESTON

WELL COMPLETION SUMMARY

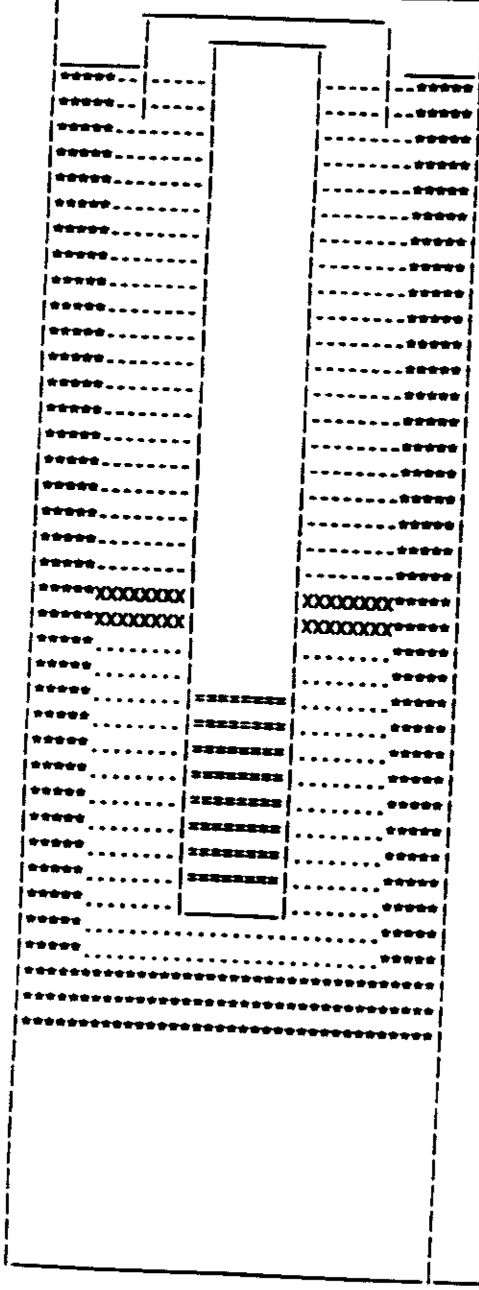
PROJECT : M.I.S. Inc.
PROJECT NO.: 3459-01-03
CLIENT : Prudential-Bache

CONTRACTOR : WESTON
DRILLING FIRM: Caribbean Well and Pump Service
INSPECTOR : Paul Landry

WELL ID No. : MW-02
COMPLETION DATE: 8-9-89
LOCATION : CORCO Site, Puerto Rico

ELEVATION
GROUND LEVEL : Surveyors data pending
TOP OF CASING: Surveyors data pending

DEPTH TO WATER (TOC): 177.57 Feet



DEPTH [FT]	
0	GS
165	BN
170	SP
187.7	SCT
207.7	SCB
217	TD

DRILLING SUMMARY

Total Depth	:	217.0 feet
Borehole Diameter:		6.0"
Driller	:	Jose Cassiano
Rig Type	:	Cable tool
Drilling Fluid	:	NA

WELL DESIGN CONSTRUCTION

Outer Casing	:	Low Carbon Steel
PVC Riser	:	147.7 feet
Stick-up	:	2.3 feet
Screen Type	:	Sch. 80/0.10 slot
Screen Material	:	Stainless Steel
Screened Interval	:	187.7 - 207.7 feet
Screen/Slot Size	:	0.010"
Screen Riser Diam.	:	2" PVC/Sch. 80
Grout/Backfill	:	165 feet
Seal	:	Bentonite
Sand Pack	:	47 feet

WELL DEVELOPMENT

Date	:	8-10-89
Method	:	Bailed
Duration/Rate	:	NA

COMMENTS

GS = GROUND SURFACE
BN = BENTONITE SEAL
TD = TOTAL DEPTH
SP = SAND PACK
SCT = SCREEN TOP
SCB = SCREEN BOTTOM

--------- = GROUT
XXXXXXXXX = SEAL
.... = SAND PACK
********* = NATURAL MATERIAL

ADDITIONAL COMMENTS:
150.0 feet of PVC riser and stick-up
40.0 feet of stainless steel riser
20.0 feetof stainless steel screen

WESTON

MONITOR WELL LOG

Monitor Well No: MW-03
Log By: Paul Landry
Date Began: 8-11-89
Date Ended: 8-22-89
Total Depth: 190 feet

Site Name: Modular Incineration Systems, Inc., CORCO Site
Subcontractor: Caribbean Well and Pump Services
Operator: Efran Echevarria
Drilling Method: Cable Tool

Comments: 6.0" diameter cable tool bit

Well Completion: Refer to MW-03 well completion diagram

GEOSCIENCES

Depth Interval (Feet)	Water Entry Depths	General Description
0 - 34		Poorly sorted silty clay with limestone gravel (fill), dry and crumbly Refer to SB-03 log for detailed description of overburden soils
34 - 45		LIMESTONE, light brown, tan-yellow fill (limestone fragments), with clay and silts becoming competent limestone
45 - 60		LIMESTONE, yellow brown-tan white, fossiliferous, friable, hard in part, occasionally crystalline
60 - 80		LIMESTONE, yellow brown-tan white, friable, hard, common fossiliferous, vuggy in part, occasionally crystalline, dry
80 - 100		LIMESTONE, yellow brown, as above, white-light brown
100 - 120		LIMESTONE, as above, producing a lot of fines (clays)
120 - 140		LIMESTONE, tan-yellow brown-white in parts, friable, hard, abundant, fossiliferous, very calcareous, moderately high clay %, probable filling in fractures, vuggy porosity * hole caving in, required 6" temporary casing installed to 129' BGS
140 - 160		LIMESTONE, tan-yellow brown-white, hard, friable, very calcareous, abundant fossiliferous and shell fragments dominant, as above with less clay percentage - gas odor
160 - 175	Water at 175'	LIMESTONE, as above, changes to gray brown, pale gray cuttings at 175', water and oil/gasoline present, color change distinct
175 - 190		LIMESTONE, as above, gray brown-pale gray-tan, fossiliferous, very calcareous, friable, hard, water increases at 185' - T.D. 190'

WESTON

WELL COMPLETION SUMMARY

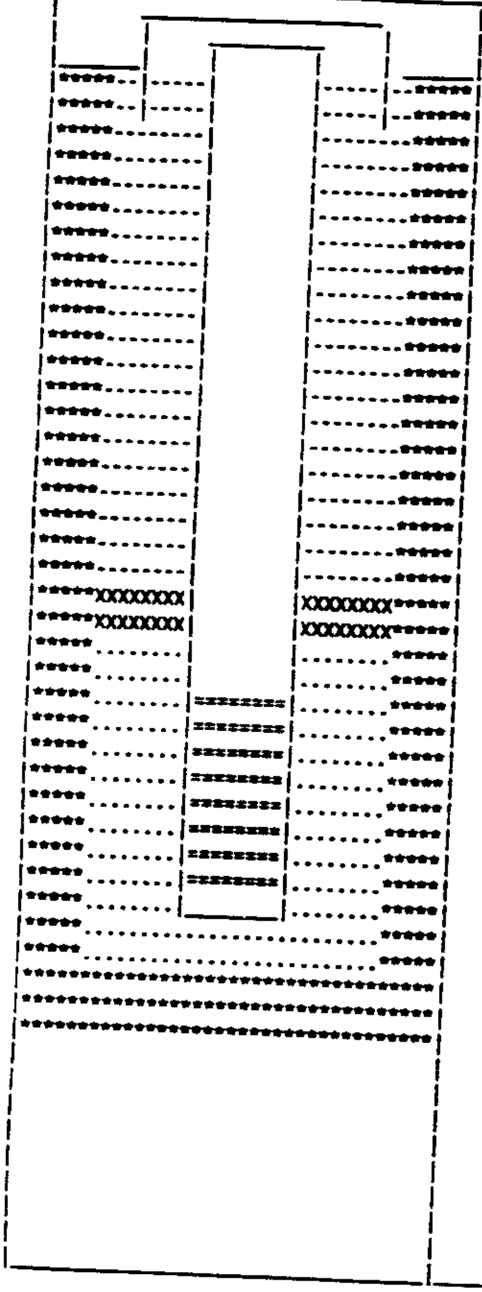
PROJECT : M.I.S. Inc.
PROJECT NO.: 3459-01-03
CLIENT : Prudential-Bache

CONTRACTOR : WESTON
DRILLING FIRM: Caribbean Well and Pump Service
INSPECTOR : Paul Landry

WELL ID No. : MW-03
COMPLETION DATE: 8-23-89
LOCATION : CORCO Site, Puerto Rico

ELEVATION
GROUND LEVEL : Surveyors data pending
TOP OF CASING (TOC): Surveyors data pending

DEPTH TO WATER (TOC): 177.08 feet



DEPTH [FT]	
0	GS
158	BN
161	SP
168	SCT
188	SCB
190	TD

DRILLING SUMMARY

Total Depth : 189.0-190.0 feet
Borehole Diameter: 6.0"
Driller : Efren Echevarria
Rig Type : Cable tool
Drilling Fluid : NA

WELL DESIGN CONSTRUCTION

Outer Casing : Low Carbon Steel

PVC Riser : 10.0 feet

Stick-up : 2.5 feet

Screen Type : Sch. 80/0.10 slot
Screen Material : Stainless Steel
Screened Interval : 168 - 188 feet
Screen/Slot Size : 0.010"
Screen Riser Diam.: 2" PVC/Sch. 80

Grout/Backfill : 158 feet

Seal : Bentonite

Sand Pack : 29 feet

WELL DEVELOPMENT

Date : 8-23-89
Method : Bailed
Duration/Rate : NA

COMMENTS

GS = GROUND SURFACE
BN = BENTONITE SEAL
TD = TOTAL DEPTH

SP = SAND PACK
SCT = SCREEN TOP
SCB = SCREEN BOTTOM

--------- = GROUT
XXXXXXXXX = SEAL
.... = SAND PACK
********* = NATURAL MATERIAL

ADDITIONAL COMMENTS:
12.5 feet of PVC riser and stick-up
158.0 feet of stainless steel riser
20.0 feetof stainless steel screen

WESTON

MONITOR WELL LOG

Monitor Well No:	MW-04
Log By:	Paul Landry
Date Began:	8-4-89
Date Ended:	8-22-89
Total Depth:	187 feet
Site Name:	Modular Incineration Systems, Inc., CORCO Site
Subcontractor:	Caribbean Well and Pump Services
Operator:	Ernest Eaves/Jose Cassiano
Drilling Method:	Air Rotary/Cable Tool

Comments: 7 7/8" air rotary bit (0-80')
6" diameter Cable tool bit from 80-187' (T.D.)

Well Completion: Refer to MW-04 well completion diagram

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx G E O S C I E N C E S xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Water entry Depth	General Description
0 - 55		Soil and rock, clays and silts with abundant limestone rock fragments grades into weathered LIMESTONE from 54-58', soils medium brown from 48', silty clay, moderately plastic Refer to SB-04 log for detailed description of overburden soils
55 - 60		Tan, buff LIMESTONE, firm, hard, occasionally brittle, fossiliferous (abundant), very calcareous, white in part
60 - 70		LIMESTONE, tan-white-yellow brown, very fossiliferous, as above, medium hard, firm
70 - 80		LIMESTONE, as above (dry)
90 - 110		LIMESTONE, yellow-brown-buff-white in part, occasionally crystalline, dense, polished faces, marble-like, dominantly vuggy and fossiliferous, hard, occasionally brittle
110 - 120		LIMESTONE, yellow brown-light brown-tan-white, friable, hard, occasionally fossiliferous, very calcareous, occasionally densely crystalline, dry
120 - 140		LIMESTONE, as above
140 - 149		LIMESTONE, tan-white-yellow brown, fossiliferous, friable, hard in part, very calcareous, dense, crystalline lenses/occasional inclusions
149 - 160		LIMESTONE, as above
160 - 170		LIMESTONE, tan-yellow brown, friable, hard, fossiliferous common
170 - 180	Water at 170-172'	LIMESTONE, gray green-gray brown, hard-friable, fossiliferous, wet, strong hydrocarbon odor, black-dark brown gasoline floating on the water - water and oil at approximately 170-172'
180 - 187		LIMESTONE, as above - T.D. 187'

WESTON

WELL COMPLETION SUMMARY

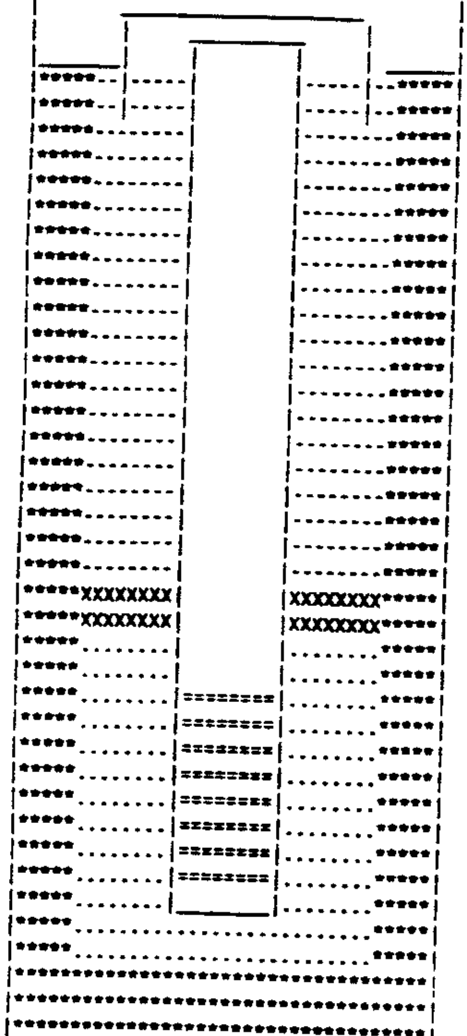
PROJECT : M.I.S. Inc.
PROJECT NO.: 3459-01-03
CLIENT : Prudential-Bache

CONTRACTOR : WESTON
DRILLING FIRM: Caribbean Well and Pump Service
INSPECTOR : Paul Landry

WELL ID No. : MW-04
COMPLETION DATE: 8-21-89
LOCATION : CORCO Site, Puerto Rico

ELEVATION
GROUND LEVEL : Surveyors data pending
TOP OF CASING (TOC): Surveyors data pending

DEPTH TO WATER (TOC): 175.42 feet



DEPTH (FT)	
0	GS
152	BN
158	SP
162	SCT
182	SCB
187	TD

DRILLING SUMMARY

Total Depth : 187.0 feet
Borehole Diameter: 6.0"
Driller : Ernest Eaves/Jose Cassia
Rig Type : Cable tool
Drilling Fluid : NA

WELL DESIGN CONSTRUCTION

Outer Casing : Low Carbon Steel

PVC Riser : 82.0 feet

Stick-up : 3.0 feet

Screen Type : Sch. 80/0.10 slot
Screen Material : Stainless Steel
Screened Interval : 162 - 182 feet
Screen/Slot Size : 0.010"
Screen Riser Diam.: 2" PVC/Sch. 80

Grout/Backfill : 152 feet

Seal : Bentonite

Sand Pack : 29 feet

WELL DEVELOPMENT

Date : 8-21-89
Method : Bailed
Duration/Rate : NA

COMMENTS

GS = GROUND SURFACE
BN = BENTONITE SEAL
TD = TOTAL DEPTH
SP = SAND PACK
SCT = SCREEN TOP
SCB = SCREEN BOTTOM

--------- = GROUT
XXXXXXXXX = SEAL
.... = SAND PACK
********* = NATURAL MATERIAL

ADDITIONAL COMMENTS:
85.0 feet of PVC riser and stick-up
80.0 feet of stainless steel riser
20.0 feetof stainless steel screen

W E S T O N

M O N I T O R   W E L L   L O G

Monitor Well No:	MW-05	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	Paul Landry	Subcontractor:	Caribbean Well and Pump Services
Date Began:	8-23-89	Operator:	Jose Cassiano
Date Ended:	8-28-89	Drilling Method:	Cable Tool
Total Depth:	187 feet		

Comments: 6" diameter Cable tool bit

Well Completion: Refer to MW-05 well completion diagram

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx G E O S C I E N C E S xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Water entry Depth	General Description
0 - 51		Mixture of weathered limestone fragments and silty orange brown clays, dry, crumbly, plastic in part, common weathered limestone fragments, white-tan, very calcareous, fossils common Refer to SB-05 log for detailed description of overburden soils
51 - 70		LIMESTONE, yellow-brown-white, tan, hard, friable, very fossiliferous, calcareous, occasional opaque shells and coral fragments in vuggy limestone matrix
70 - 90		LIMESTONE, as above
90 - 110		LIMESTONE, yellow brown-tan-white in part, very fossiliferous, abundant shells and coral fragments, very calcareous, occasional moderate clay percentage in sample, dry
110 - 130		LIMESTONE, as above, moderate clay percentage at 125-130', some cave-in
130 - 150		LIMESTONE, yellow brown-tan-white, very fossiliferous, vuggy porosity in part, hard-friable, moderately high clay percentage, dry * Hole caved in to 122', 6" temporary casing installed to 136' BGS
150 - 170		LIMESTONE, tan-yellow brown-white, hard-friable, very fossiliferous, calcareous, as above, dry
170 - 180		LIMESTONE, as above
180 - 190	Water at 190'	LIMESTONE, tan-yellow brown-gray brown-pale gray at 190', hard-friable, hydrocarbon odor, no visible oil/gasoline
190 - 204		LIMESTONE, as above, pale gray-gray brown-tan yellow - T.D. 204'

WESTON

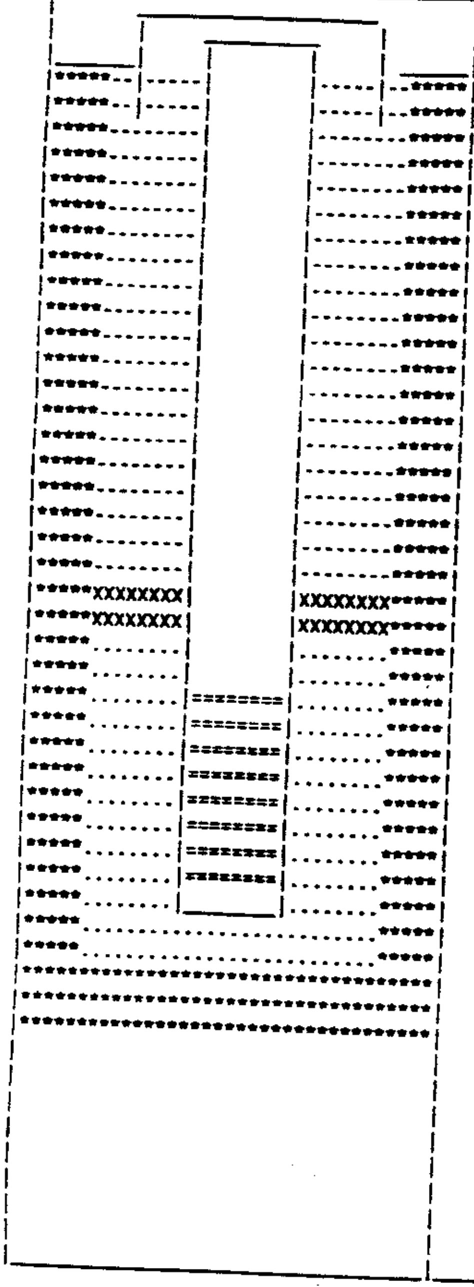
WELL COMPLETION SUMMARY

PROJECT : M.I.S. Inc.
PROJECT NO.: 3459-01-03
CLIENT : Prudential-Bache

CONTRACTOR : WESTON
DRILLING FIRM: Caribbean Well and Pump Service
INSPECTOR : Paul Landry

WELL ID No. : MW-05
COMPLETION DATE: 8-30-89
LOCATION : CORCO Site, Puerto Rico

ELEVATION
DEPTH TO WATER (TOC): 165.05 feet
GROUND LEVEL : Surveyors data pending
TOP OF CASING (TOC): Surveyors data pending



DEPTH [FT]	
0	GS
157	BN
160	SP
166.7	SCT
196.7	SCB
204	TD

DRILLING SUMMARY

Total Depth : 204.0 feet
Borehole Diameter: 6.0"
Driller : Jose Cassiano
Rig Type : Cable tool
Drilling Fluid : NA

WELL DESIGN CONSTRUCTION

Outer Casing : Low Carbon Steel

PVC Riser : 146.7 feet

Stick-up : 1.3 feet

Screen Type : Sch. 80/0.10 slot
Screen Material : Stainless Steel
Screened Interval : 166.7 - 196.7 feet
Screen/Slot Size : 0.010"
Screen Riser Diam.: 2" PVC/Sch. 80

Grout/Backfill : 157 feet

Seal : Bentonite

Sand Pack : 44 feet

WELL DEVELOPMENT

Date : 8-30-89
Method : Bailed
Duration/Rate : NA

COMMENTS

GS = GROUND SURFACE
BN = BENTONITE SEAL
TD = TOTAL DEPTH
SP = SAND PACK
SCT = SCREEN TOP
SCB = SCREEN BOTTOM

--------- = GROUT
XXXXXXXXX = SEAL
.... = SAND PACK
********* = NATURAL MATERIAL

ADDITIONAL COMMENTS:
148.0 feet of PVC riser and stick-up
20.0 feet of stainless steel riser
30.0 feetof stainless steel screen

WESTON

MONITOR WELL LOG

Monitor Well No:	MW-06	Site Name:	Modular Incineration Systems, Inc., CORCO Site
Log By:	Paul Landry	Subcontractor:	Caribbean Well and Pump Services
Date Began:	8-23-89	Operator:	Efran Echevarria
Date Ended:	8-28-89	Drilling Method:	Cable Tool
Total Depth:	187 feet		

Comments: 6" diameter Cable tool bit

Well Completion: Refer to MW-06 well completion diagram

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx GEOSCIENCES xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Depth Interval (Feet)	Water entry Depth	General Description
0 - 44		Mixture of red brown silty clay with abundant weathered limestone fragments and boulders, dry, crumbly soils, fossiliferous limestone Refer to SB-06 log for detailed description of overburden soils
44 - 60		LIMESTONE, white-yellow brown-tan, hard, friable in part, very fossiliferous, calcareous, occasional moderate clay percentage, dry
60 - 80		LIMESTONE, as above
80 - 100		LIMESTONE, yellow brown-tan-white, highly fossiliferous, coral and shells in limestone matrix, very calcareous, occasional vuggy porosity, hard-friable, moderate red brown clay
100 - 120		LIMESTONE, tan-off white-yellow brown, friable-chalky-hard, vuggy in part, fossils common, very calcareous
120 - 140		LIMESTONE, as above
140 - 160		LIMESTONE, dark, yellow brown, off white, very fossiliferous, hard-brittle in part, occasionally red-red brown, vuggy limestone with dark brown specks
160 - 180	Water at 180'/15 gpm	LIMESTONE, as above, turns pale gray-gray brown at 180' with water/gasoline inflow, hydrocarbon odor strong
180 - 200		LIMESTONE, as above, gray brown, fossiliferous, hard, brittle, dark brown gasoline and water - T.D. 200' BGS

W E S T O N

WELL COMPLETION SUMMARY

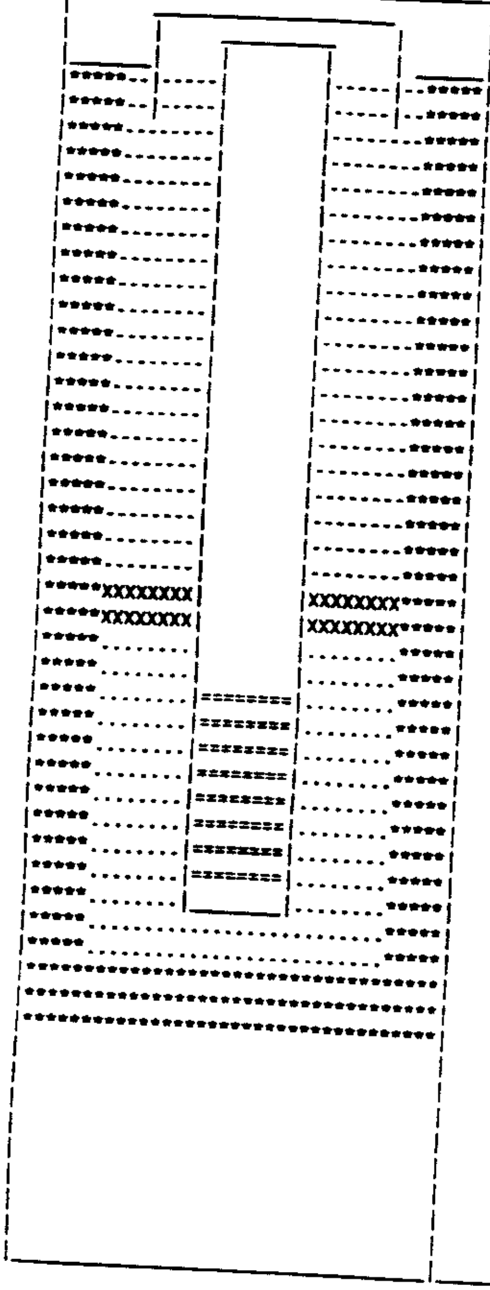
PROJECT : M.I.S. Inc.
PROJECT NO.: 3459-01-03
CLIENT : Prudential-Bache

CONTRACTOR : WESTON
DRILLING FIRM: Caribbean Well and Pump Service
INSPECTOR : Paul Landry

WELL ID No. : MW-06
COMPLETION DATE: 8-29-89
LOCATION : CORCO Site, Puerto Rico

ELEVATION
GROUND LEVEL : Surveyors data pending
TOP OF CASING (TOC): Surveyors data pending

DEPTH TO WATER (TOC): 173.12 feet



DEPTH [FT]	
0	GS
146	BN
155	SP
168	SCT
198	SCB
200	TD

DRILLING SUMMARY

Total Depth : 200.0 feet
Borehole Diameter: 6.0"
Driller : Efran Echevarria
Rig Type : Cable tool
Drilling Fluid : NA

WELL DESIGN CONSTRUCTION

Outer Casing : Low Carbon Steel

PVC Riser : 128.0 feet

Stick-up : 2.0 feet

Screen Type : Sch. 80/0.10 slot
Screen Material : Stainless Steel
Screened Interval : 168.0 - 198.0 feet
Screen/Slot Size : 0.010"
Screen Riser Diam.: 2" PVC/Sch. 80

Grout/Backfill : 146 feet

Seal : Bentonite

Sand Pack : 45 feet

WELL DEVELOPMENT

Date : 8-29-89
Method : Bailed
Duration/Rate : NA

COMMENTS

GS = GROUND SURFACE
BN = BENTONITE SEAL
TD = TOTAL DEPTH
SP = SAND PACK
SCT = SCREEN TOP
SCB = SCREEN BOTTOM

--------- = GROUT
XXXXXXXXX = SEAL
.... = SAND PACK
********* = NATURAL MATERIAL

ADDITIONAL COMMENTS:
130.0 feet of PVC riser and stick-up
40.0 feet of stainless steel riser
30.0 feet of stainless steel screen

BORING LOG

GDC

Page 1 of 1

BORING NO. EL-1

PROJECT NO. 93-562
DATE 12/7/93
BORING TYPE HSA
GEOLOGIST TB
DRILLER CARIBBEAN SOIL TESTING, INC.

PROJECT: Site Assessment
LOCATION: Eastern Oil Lagoon, CORCO, Ponce, Puerto Rico
COORDINATES: (survey data pending) N (survey data pending) E

LITHOLOGIC DESCRIPTION

TOP OF PAD ELEVATION 12.93

DEPTH FEET	SPT OR P	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
	13spt	CH. CLAY, dark gray, trace of small gravel, weak HCl reaction, rootlets, blocky, moist, medium stiff	75	EL-1 0-2'	0.0
	20spt		50		0.0
5	5spt	MH. SILT, dark gray, with clay lenses, moderate HCl reaction, laminations, trace of organics, trace of gravel (<10mm dia.), moist, medium stiff	75	EL-1 2-6'	0.0
	20spt	SC. CLAYEY SAND, dark gray, medium HCl reaction, few shell fragments, trace of small gravel (<10mm dia.), moist, interbedded with sandy clay, subangular to subrounded, saturated below 7'	100		0.0
10	9spt	silty clay layer (4-5") in the interval 9' to 10'	100		0.0
	19spt	SP. GRAVELY SAND, gray, poorly graded (<20mm dia.), strong HCl reaction, shell fragments, subrounded particles, hard gravel, moist	75		0.0
	30spt		50		0.0
15					
20					
25		NOTE: Due to heaving of sands and gravels into auger, the first borehole was abandoned. The second borehole was hollow stem augered to 30' without sampling.			
30		Boring completed at 30 feet			
35					

INDEX:

Shelby Tube
Split Spoon
Auger
No Recovery

Initial Water Level
Final Water Level
SPT - Standard Penetration Test (BLOWS/FT)
P - Pocket Penetrometer Reading (TSF)

FIGURE B-1

BORING LOG

GDC

BORING NO. EL-2

Page 1 of 1

PROJECT: Site Assessment

LOCATION: Eastern Oil Lagoon, CORCO, Ponce, Puerto Rico

COORDINATES: (survey data pending) N (survey data pending) E

PROJECT NO. 93-562

DATE 12/9/93

BORING TYPE HSA

GEOLOGIST TB

DRILLER CARIBBEAN SOIL TESTING, INC.

LITHOLOGIC DESCRIPTION

TOP OF PAD ELEVATION 15.11

DEPTH FEET	WATER	SPT OR P	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
			GC, CLAYEY GRAVEL, tan to light reddish-brown, limestone fragments (<40mm dia.), dry, trace of fine sand, strong HCl reaction, subangular particles, caliche fill material	95		0.0
		28spt		95		0.0
		29spt		95		0.0
5		24spt		95		0.0
		52spt		95		0.0
10		67spt		95		0.0
		35spt		100		0.0
		21spt	CH, CLAY, gray, moist, some organic matter, trace of small gravel (<10mm dia.) mild HCl reaction, mottled	100		0.0
15		7spt	dark gray			
		19spt	CL, SILTY CLAY, dark gray, moist, trace of small gravel (<5mm dia.), lenses of very fine sand, moderate HCl reaction	100		0.0
		11spt	sand lenses (2-3"), moist to saturated, wood fragments, organics, med. HCl reaction	100		0.0
20		9spt	CL, SANDY CLAY, mottled with dark brown and gray, wood fragments, trace of small gravel (<8mm dia.),	100		0.0
	▽	19spt		100		0.0
25		20spt	dark gray, sand seams (2-3") below 24 feet	100		0.0
		66spt	SP, SAND, dark gray, limestone fragments, <10% fines, poorly graded, coarse, rounded to subrounded particles, strong HCl reaction	75		0.0
		81spt		50		0.0
30			NOTE: Sampling was stopped at 30 feet; boring advanced to 35 feet			
35			Boring completed at 35 feet			

INDEX:

- Shelby Tube
- Split Spoon
- Auger
- No Recovery
- ▽ Initial Water Level
- ▼ Final Water Level
- SPT - Standard Penetration Test (BLOWS/FT)
- P - Pocket Penetrometer Reading (TSF)

FIGURE B-2

BORING LOG

GDC

BORING NO. EL-3

PROJECT: Site Assessment

LOCATION: Eastern Oil Lagoon, CORCO, Ponce, Puerto Rico

COORDINATES: (survey data pending) N (survey data pending) E

PROJECT NO. 93-562

DATE 12/10/93

BORING TYPE HSA

GEOLOGIST TB

DRILLER CARIBBEAN SOIL TESTING, INC.

LITHOLOGIC DESCRIPTION

TOP OF PAD ELEVATION 7.87

DEPTH FEET	WATER	SPT OR P	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
		14spt	CH. CLAY, dark gray mottled brown, trace of organics and wood fragments, trace of small gravel, moderate HCl reaction, blocky, damp, medium stiff	100		0.0
		11spt	small lenses of clayey silt below 2 feet	100		0.0
5		4spt	MH. CLAYEY SILT, dark brown, very mild HCl reaction, trace of organics, several very thin clay lenses (¾-1") interbedded, elastic, moist	100		0.0
		5spt	CL. SILTY CLAY, brown to dark brown, silt seams interbedded, organics, trace of very fine sand, moderate HCl reaction	100		0.0
	▽	8spt	dark gray, clayey silt interbedded, rootlets, moist below 8 feet	100		0.0
10		4spt	clayey sand seam (5"), fine to medium fine sand, subrounded grains, saturated in the interval 11'-12'	100		0.0
		3spt	silt layer (5-6"), very moist to saturated in the interval 13'-14'	100		0.0
15		5spt	SP. SAND, dark gray, medium to coarse grains, few fines, moderate HCl reaction, shell fragments, trace of small gravel (<13mm dia.)	90		0.0
20						
25			NOTE: Due to heaving of sands and gravels into auger, the unconsolidated material was sampled via split spoon to 16 feet, and continuously hollow stem augered to 30 feet without sampling.			
30			Boring completed at 30 feet			
35						

INDEX:

- Shelby Tube
- Split Spoon
- Auger
- No Recovery
- ▽ Initial Water Level
- ▼ Final Water Level
- SPT - Standard Penetration Test (BLOWS/FT)
- P - Pocket Penetrometer Reading (TSF)

FIGURE B-3

BORING LOG

GDC

BORING NO. EL-4

PROJECT: Site Assessment

LOCATION: Eastern Oil Lagoon, CORCO, Ponce, Puerto Rico

COORDINATES: (survey data pending) N (survey data pending) E

PROJECT NO. 93-562

DATE 12/13/93

BORING TYPE HSA

GEOLOGIST TB

DRILLER CARIBBEAN SOIL TESTING, INC.

LITHOLOGIC DESCRIPTION

TOP OF PAD ELEVATION 8.04

DEPTH FEET	WATER	SPT OR P	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
		14spt	CH, CLAY, dark brown, clayey silt lenses, organics, roots, rootlets, blocky, damp, medium to strong HCl reaction, some shell fragments	75		0.0
		7spt		50		0.0
5		7spt	CL, SANDY CLAY, dark brown, trace of shell fragments, strong HCl reaction, subangular sand particles, medium fine grains	75		0.0
	▽	6spt	SC, CLAYEY SAND, dark brown to dark gray, fine sand, trace of small gravel (<7mm dia.), medium HCl reaction, organics and rootlets, subangular, saturated, sandy clay interbedded below 8 feet	100		0.0
		8spt		90		0.0
10		4spt	coarse sand interbedded below 10 feet	90		0.0
		11spt		90		0.0
15						
20						
25			NOTE: Due to heaving of sands and gravels into auger, the unconsolidated material was sampled via split spoon to 14 feet, and hollow stem augered to 30 feet without sampling.			
30			Boring completed at 30 feet			
35						

INDEX:

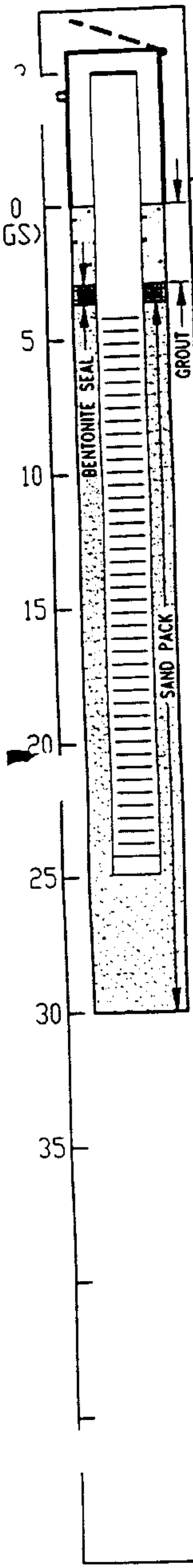
- Shelby Tube
- Split Spoon
- Auger
- No Recovery
- ▽ Initial Water Level
- ▼ Final Water Level
- SPT – Standard Penetration Test (BLOWS/FT)
- P – Pocket Penetrometer Reading (TSF)

FIGURE B-4

WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. EL-1
Top/Pad Elev. 12.93
TOC Elev. 15.29

Location or Coords. (survey data pending)



DRILLING SUMMARY

Tot. Depth 30'
Borehole Dia. 8"
Driller CARIBBEAN SOIL TESTING
Rig ACKER
Bit(s) HOLLOW STEM
Drilling Fluid N/A
Surf. Casing 4" CARBON STEEL

CONSTRUCTION TIME LOG

TASK		START Date	START Time	FINISH Date	FINISH Time
Drilling:	EL-1(1ST)	7DEC93	0900	8DEC93	1400
	EL-1(2ND)	8DEC93	1500	8DEC93	1800
Geophys. Logging:	EL-1(1ST)	7DEC93	0900	8DEC93	1400
	EL-1(2ND)	8DEC93	1500	8DEC93	1800
Geophys. Logging:					
Casing:	RISER	8DEC93	1615	8DEC93	1630
Casing:	PROTECTIVE	9DEC93	0950	9DEC93	0955
Filter Placement:		8DEC93	1630	8DEC93	1700
Cementing:		9DEC93	0820	9DEC93	1000
Development:		15DEC93	1645	15DEC93	1815

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+3 - -4	C
-4 - -24	S
-24 - -25	SUMP

Casing C1 PROTECTIVE CASING SURFACE TO +3.5 FT.
C2 2" SS RISER +3' TO -4'

Screen S1 -4' to -24'
-24' to -25'

Sump #10 SLOT

Centralizers

Filter Matl. 6/20 SAND
-4' to -30'

Cement PORTLAND TYPE 1
BENTONITE MIX -SURFACE to -3.5'

Other 1/4" BENTONITE PELLETS
-3.5' to -4'

WELL DEVELOPMENT

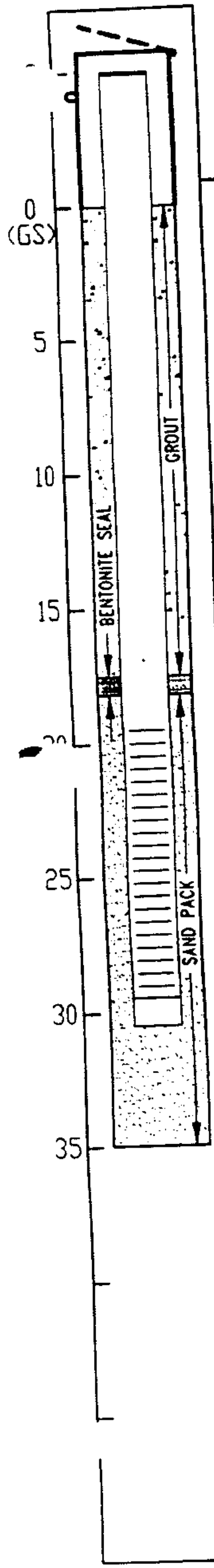
	pH	TEMP (°C)	SP.COND. µmhos
Initial	7.2	27	900
After Surging	7.3	27	900
During Bailing	7.2	27	850
During Bailing	7.2	27	825
During Pumping	7.3	27	825
During Pumping	7.3	27	800
During Pumping	7.3	27	800
During Pumping	7.3	27	800

COMMENTS

SUMP WAS SET @-25 FT. -SANDS HEAVED UPWARD FROM -30 FT. - THE REMAINDER OF SPACE BETWEEN BOTTOM OF SUMP AND BOTTOM OF BORING WAS FILLED WITH SAND.

FIGURE C-1

GDC



WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. EL-2
Top/Pad Elev. 15.11
TOC Elev. 17.28

Location or Coords. (survey data pending)

DRILLING SUMMARY

Tot. Depth 35'
Borehole Dia. 8"
Driller CARIBBEAN SOIL TESTING
Rig ACKER
Bit(s) HOLLOW STEM
Drilling Fluid N/A
Surf. Casing 4" CARBON STEEL

CONSTRUCTION TIME LOG

TASK		START Date	START Time	FINISH Date	FINISH Time
Drilling:		9DEC93	1200	9DEC93	1520
		10DEC93	0800	10DEC93	1000
Geophys. Logging:					
Casing:	RISER	10DEC93	1000	10DEC93	1115
Geophys. Logging:					
Casing:	PROTECTIVE	13DEC93	1045	13DEC93	1215
Filter Placement:		10DEC93	1030	10DEC93	1115
Cementing:		13DEC93	1045	13DEC93	1215
Development:		16DEC93	0815	16DEC93	1000

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+3	-19.5	C
-19.5	-29.5	S
-29.5	-30.5	SUMP

Casing C1 PROTECT. CASING -SURFACE to +3.5 FT.
C2 2" SS RISER +3' to -19.5'
Screen S1 #10 SLOT -19.5' to -29.5'
Sump -29.5' to -30.5'
Centralizers
Filter Matl. 6/20 SAND -18' to -35'
Cement PORTLAND TYPE 1 BENTONITE MIX -SURFACE to -17'
Other 1/4" BENTONITE PELLETS -17' to -18'

WELL DEVELOPMENT

	pH	TEMP (°C)	SP.COND. µmhos
Initial	7.0	28	3100
After Surging	7.0	28	3000
During Bailing	7.1	29	2700
During Bailing	7.1	29	2650
During Pumping	7.1	29	2400
During Pumping	7.2	29	2450
During Pumping	7.3	29	2550
During Pumping	7.3	29	2350
During Pumping	7.3	29	2350
During Pumping	7.3	29	2350

COMMENTS

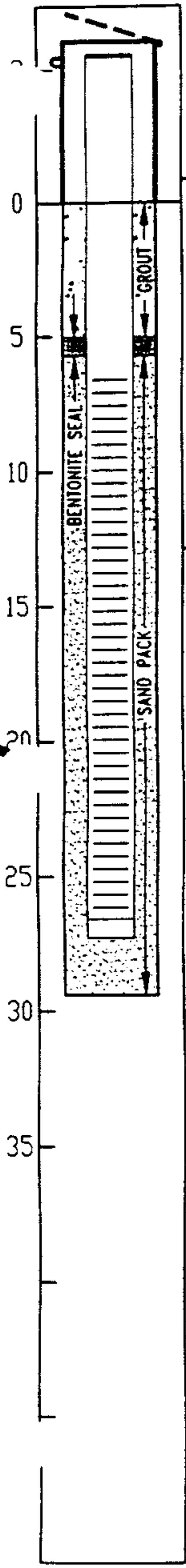
DUE TO HEAVING OF SANDS AND COLLAPSING, A 20-FOOT SCREEN COULD NOT BE SET. A 10-FOOT SECTION OF SCREEN WAS REMOVED AND THE WELL WAS SET USING THE REMAINING 10-FOOT SECTION OF SCREEN.

FIGURE C-2

GDC

WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. EL-3
Location or Coords. (survey data pending)
Top/Pad Elev. 7.87
TOC Elev. 10.10



DRILLING SUMMARY

Tot. Depth 29'
Borehole Dia. 8"
Driller CARIBBEAN SOIL TESTING
Rig ACKER
Bit(s) HOLLOW STEM
Drilling Fluid N/A
Surf. Casing 4" CARBON STEEL

CONSTRUCTION TIME LOG

TASK		START Date	START Time	FINISH Date	FINISH Time
Drilling:		10DEC93	1300	10DEC93	1530
		13DEC93	0730	13DEC93	0945
Geophys. Logging:					
Casing:	RISER	14DEC93	0840	14DEC93	0930
Geophys. Logging:					
Casing:	PROTECTIVE	14DEC93	1010	14DEC93	1015
Filter Placement:		14DEC93	0800	14DEC93	0930
Cementing:		14DEC93	0930	14DEC93	1030
Development:		16DEC93	1135	16DEC93	1245

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+3.5	-6.5	C
-6.5	-26.5	S
-26.5	-27.5	SUMP

Casing C1 PROTECT. CASING -SURFACE to +4 FT.
C2 2" SS RISER +3.5' to -6.5'
Screen S1 #10 SLOT -6.5' to -26.5'
Sump -26.5' to -27.5'
Centralizers
Filter Matl. 6/20 SAND -5.5' to -29'
Cement PORTLAND TYPE 1 BENTONITE MIX -SURFACE to -5'
Other 1/4" BENTONITE PELLETS -5' to -5.5'

WELL DEVELOPMENT

	pH	TEMP (°C)	SP.COND. µmhos
Initial	7.4	29	1900
After Surging	7.5	29	1875
During Bailing	7.4	29	1850
During Bailing	7.5	29	1850
During Pumping	7.5	29	1875
During Pumping	7.5	29	1900
During Pumping	7.5	29	1900
During Pumping	7.5	29	1900
During Pumping	7.5	29	1900

COMMENTS

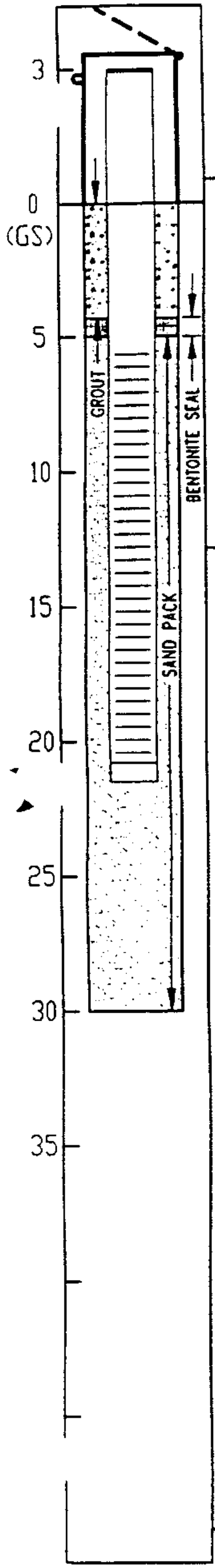
SUMP WAS SET AT -27.5 FT.; SANDS HEAVED UPWARD FROM -29 FT.; THE REMAINDER OF THE SPACE BETWEEN THE BOTTOM OF THE SUMP AND THE BOTTOM OF THE BORING WAS FILLED WITH SAND.

FIGURE C-3

GDC

WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. EL-4
Location or Coords. (survey data pending)
Top/Pad Elev. 8.04
TOC Elev. 10.79



DRILLING SUMMARY

Tot. Depth 30'
Borehole Dia. 8"
Driller CARIBBEAN SOIL TESTING
Rig ACKER
Bit(s) HOLLOW STEM
Drilling Fluid N/A
Surf. Casing 4" CARBON STEEL

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+3 – -6	C	
-6 – -21	S	
-21 – -22	SUMP	

Casing C1 PROTECT. CASING -SURFACE to +3.5 FT.
C2 2" SS RISER +3' to -6'
Screen S1 #10 SLOT -6' to -21'
Sump -21' to -22'
Centralizers
Filter Matl. 6/20 SAND -5' to -30'
Cement PORTLAND TYPE 1 BENTONITE MIX-SURFACE to -4.5'
Other 1/4" BENTONITE PELLETS -4.5' to -5'

CONSTRUCTION TIME LOG

TASK		START Date	START Time	FINISH Date	FINISH Time
Drilling:		13DEC93	1200	13DEC93	1530
		14DEC93	0715	14DEC93	0900
Geophys. Logging:					
Casing:	RISER	14DEC93	0800	14DEC93	0830
Geophys. Logging:					
Casing:					
	PROTECTIVE CASING	14DEC93	0830	14DEC93	0900
Filter Placement:		14DEC93	0745	14DEC93	0915
Cementing:		14DEC93	0930	14DEC93	1030
Development:		16DEC93	1135	16DEC93	1245

WELL DEVELOPMENT

	pH	TEMP (°C)	SP.COND. µmhos
Initial	7.5	29	2200
After Surging	7.5	29	2200
During Bailing	7.5	29	2100
During Bailing	7.4	29	2100
During Pumping	7.4	29	2250
During Pumping	7.4	29	2300
During Pumping	7.4	29	2300
During Pumping	7.4	29	2300

COMMENTS

SUMP WAS SET @ -21 FT. -SANDS HEAVED UPWARD FROM -30 FT.; THE REMAINDER OF SPACE BETWEEN BOTTOM OF SUMP AND BOTTOM OF BORING WAS FILLED WITH SAND.

FIGURE C-4

GDC

GDC BORING LOG

BORING NO. WL-1

PROJECT: Site Assessment

LOCATION: Western Lagoon Area, CORCO, Ponce, Puerto Rico

COORDINATES: (survey data pending) N (survey data pending) E

PROJECT NO. 93-562

DATE 12/3/93

BORING TYPE HSA

GEOLOGIST TB

DRILLER CARIBBEAN SOIL TESTING, INC.

LITHOLOGIC DESCRIPTION

TOP OF PAD ELEVATION 5.55

DEPTH FEET	WATER	SPT OR P	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
			CL, SILTY CLAY, dark brown, with very fine sand, moist, weak HCl reaction, firm, fissured			
		39spt	GC, CLAYEY GRAVEL, tan to light brown, subangular, dry, strong HCl reaction,	100	WL-1 0-2'	175
			moderate cementation, blocky, max. particle size 30mm, caliche fill or colluvium			
		36spt	moist below 3'	100		200
5		8spt	hydrocarbon staining below 5'	100		1000
			CL, SILTY CLAY, grayish-black to gray, with gravel, hydrocarbon staining to 8',		WL-1 2-8'	
	∇	20spt	soft, medium to low plasticity, max. particle size 12mm	100		200
			dark gray, with trace of fine sand (no gravel) below 8'			
10		0spt	hydrocarbons in water saturated soils in the interval 8'-12'	100		1000
		1spt		100		200
		10spt	CH, CLAY, tan with mottling, homogeneous, trace of silt, reddish-brown iron staining,	100		20
15		11spt	high plasticity, stiff, damp	100		5
			Boring completed at 16 feet			
20						
25						
30						
35						

INDEX:

- Shelby Tube
- Split Spoon
- Auger
- No Recovery
- ∇ Initial Water Level
- ▼ Final Water Level
- SPT – Standard Penetration Test (BLOWS/FT)
- P – Pocket Penetrometer Reading (TSF)

FIGURE B-5

BORING LOG

GDC

Page 1 of 1

BORING NO. WL-2

PROJECT NO.	93-562
DATE	12/15/93
BORING TYPE	HSA
GEOLOGIST	TB
DRILLER	CARIBBEAN SOIL TESTING, INC.

PROJECT: Site Assessment

LOCATION: Western Lagoon Area, CORCO, Ponce, Puerto Rico

COORDINATES: (survey data pending) N (survey data pending) E

LITHOLOGIC DESCRIPTION

TOP OF PAD ELEVATION 9.07

DEPTH FEET	WATER	SPT OR P	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
0–2		31spt	FILL, caliche fill material, light brown, strong HCl reaction, road fill	90		5.0
2–4		14spt		0		5.0
4–6		6spt	CL, SILTY CLAY, greenish-gray and dark gray, clay seams, mottled, organics, wood fragments, hydrocarbon odor medium HCl reaction, coarse sand lense (2-3") in the interval 6'-7' coarse sand layers (4-6") interbedded below 8', hydrocarbons evident, saturated below 8'	100		5.0
6–8	▽	8spt		100		20.0
8–10		11spt		100		20.0
10–12		17spt	SC, CLAYEY SAND, dark gray, strong HCl reaction, subangular to subrounded, saturated SP, GRAVELY SAND, dark gray, subangular to subrounded particles, max. size 12mm, strong HCl reaction, saturated	75		20.0

NOTE: Due to heaving of sands and gravels into auger, the unconsolidated material was sampled via split spoon to 12 feet, and hollow stem augered to 29 feet without sampling.

Boring completed at 29 feet

INDEX:

- Shelby Tube
- Split Spoon
- Auger
- No Recovery
- ▽ Initial Water Level
- ▼ Final Water Level
- SPT – Standard Penetration Test (BLOWS/FT)
- P – Pocket Penetrometer Reading (TSF)

FIGURE B-6

BORING LOG

GDC

BORING NO. WL-3

PROJECT: Site Assessment

LOCATION: Western Lagoon Area, CORCO, Ponce, Puerto Rico

COORDINATES: (survey data pending) N (survey data pending) E

PROJECT NO. 93-562

DATE 12/15/93

BORING TYPE HSA

GEOLOGIST TB

DRILLER CARIBBEAN SOIL TESTING, INC.

LITHOLOGIC DESCRIPTION

TOP OF PAD ELEVATION 6.51

DEPTH FEET	WATER	SPT OR P	SAMPLE	PROFILE	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
		35spt	Split Spoon		FILL, caliche fill material, limestone, gravel strong organic odor	100		
		20spt	Split Spoon			100		22.0
5		7spt	Split Spoon		CH, CLAY, greenish-brown, mottled, limestone and gravel inclusions (max. size 12mm), very strong organic odor, strong HCl reaction, damp	75		55.0
	▽	3spt	Split Spoon		CL, SANDY CLAY, greenish-brown, with gravel inclusions, strong HCl reaction, organic odor clayey sand lenses, distinct color change to dark gray at 8', saturated	20		60.0
		2spt	Split Spoon		SC, CLAYEY SAND, dark gray, subangular to subrounded particles, moderate HCl reaction	75		60.0
10		6spt	Split Spoon		SP, SAND, dark gray, coarse, shell fragments, small gravel (<7mm dia.), subangular, moderate HCl reaction, saturated	75		80.0
15–29			Auger		NOTE: Due to heaving of sands and gravels into auger, the unconsolidated material was sampled via split spoon to 12 feet, and hollow stem augered to 29 feet without sampling.			
29					Boring completed at 29 feet			

Depth scale: 5, 10, 15, 20, 25, 30, 35

INDEX:

- Shelby Tube
- Split Spoon
- Auger
- No Recovery
- ▽ Initial Water Level
- ▼ Final Water Level
- SPT – Standard Penetration Test (BLOWS/FT)
- P – Pocket Penetrometer Reading (TSF)

FIGURE B-7

BORING LOG

GDC

Page 1 of 1

BORING NO. WL-4

PROJECT: Site Assessment

LOCATION: Western Lagoon Area, CORCO, Ponce, Puerto Rico

COORDINATES: (survey data pending) N (survey data pending) E

PROJECT NO. 93-562

DATE 12/14/93

BORING TYPE HSA

GEOLOGIST TB

DRILLER CARIBBEAN SOIL TESTING, INC.

LITHOLOGIC DESCRIPTION

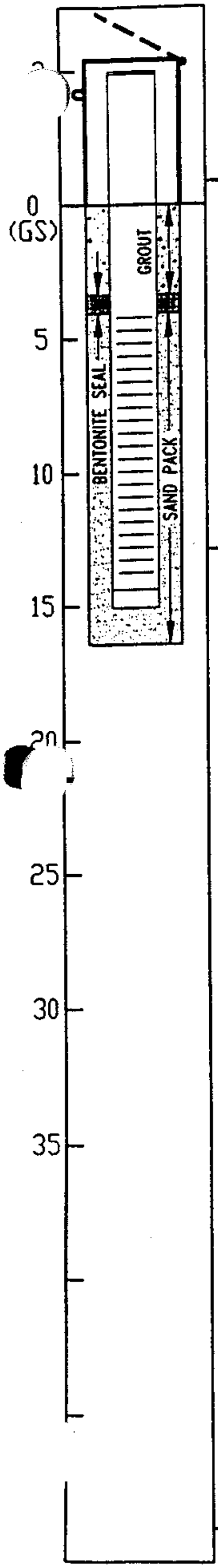
TOP OF PAD ELEVATION 5.55

DEPTH FEET	WATER	SPT OR P	SAMPLE	PROFILE	LITHOLOGIC DESCRIPTION	Percent Recovery	Sample Ident.	VC (ppm)
0–4	▽ (~4)		Auger		FILL, caliche fill material, road fill			
5		1spt	Split Spoon		CL, SILTY CLAY, gray with reddish-brown, silt lenses, very moist, medium HCl reaction, soft to very soft, rootlets, trace of gravel, clayey silt layer (3"), saturated	100		15.0
		1spt	Split Spoon		ML, CLAYEY SILT, dark gray, soft, trace of fine sand, medium HCl reaction	100		10.0
10		20spt	Split Spoon		SP, GRAVELLY SAND, coarse sand with medium to fine gravel (max. size 19mm), some shell fragments, strong HCl reaction, <10% fines, subangular	100		12.0
10–30			Auger		NOTE: Due to heaving of sands and gravels into auger, the unconsolidated material was sampled via split spoon to 10 feet, and hollow stem augered to 30 feet without sampling.			
30					Boring completed at 30 feet			

INDEX:

- Shelby Tube
- Split Spoon
- Auger
- No Recovery
- ▽ Initial Water Level
- ▼ Final Water Level
- SPT – Standard Penetration Test (BLOWS/FT)
- P – Pocket Penetrometer Reading (TSF)

FIGURE B-8



WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. WL-1
Location or Coords. (survey data pending)
Top/Pad Elev. 5.55
TOC Elev. 8.03

DRILLING SUMMARY

Tot. Depth 16'
Borehole Dia. 8"
Driller CARIBBEAN SOIL TESTING
Rig ACKER
Bit(s) HOLLOW STEM
Drilling Fluid N/A
Surf. Casing 4" CARBON STEEL

CONSTRUCTION TIME LOG

TASK		START Date	START Time	FINISH Date	FINISH Time
Drilling:		3DEC93	1100	3DEC93	1430
		6DEC93	0730	6DEC93	0830
Geophys. Logging:					
Casing:	RISER	6DEC93	1055	6DEC93	1130
Geophys. Logging:		N/A			
Casing:	PROTECTIVE	7DEC93	0815	7DEC93	0900
Filter Placement:		6DEC93	1055	6DEC93	1130
Cementing:		7DEC93	0815	7DEC93	0900
Development:		16DEC93	1655	16DEC93	1800

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+3 - -4	C
-4 - -14	S
-14 - -15	SUMP

Casing C1 PROTECT. CASING -SURFACE to +3.5 FT.
C2 2" SS RISER +3' to -4'
Screen S1 #10 SLOT -4' to -14'
Sump -14' to -15'
Centralizers
Filter Matl. 6/20 SAND -4' to -16'
Cement PORTLAND TYPE 1 BENTONITE MIX -SURFACE to -3'
Other 1/4" BENTONITE PELLETS -3' to -4'

WELL DEVELOPMENT

	pH	TEMP (°C)	SP.COND. µmhos
Initial	6.9	29	25,000
After Surging	7.0	29	23,000
During Bailing	6.9	29	24,000
During Bailing	6.9	29	240000
During Pumping	6.9	29	24,000
During Pumping	6.9	29	24,000
During Pumping	6.9	29	23,000
During Pumping	6.9	29	22,000
During Pumping	6.9	29	22,000

COMMENTS

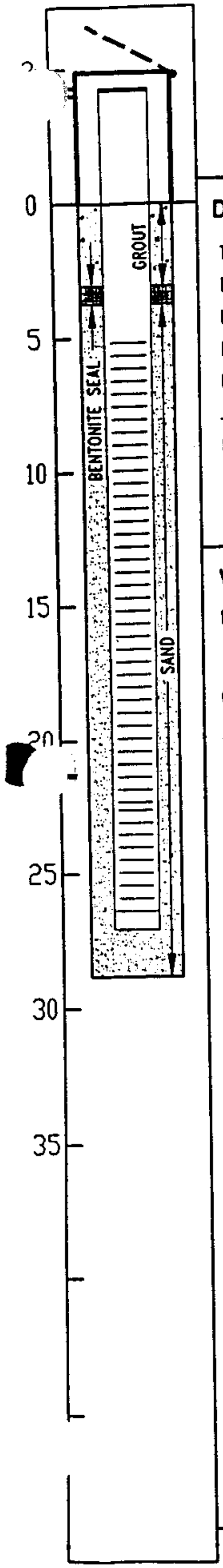
DUE TO THE CONFINING LAYER THAT WAS ENCOUNTERED AT 13 FEET, ONLY A 10-FOOT SECTION OF SCREEN WAS USED; DURING DEVELOPMENT WELL PUMPED DRY HYDROCARBONS ARE EVIDENT

FIGURE C-5

GDC

WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. WL-2
Location or Coords. (survey data pending)
Top/Pad Elev. 9.07
TOC Elev. 10.28



DRILLING SUMMARY

Tot. Depth: 29'
Borehole Dia.: 8"
Driller: CARIBBEAN SOIL TESTING
Rig: ACKER
Bit(s): HOLLOW STEM
Drilling Fluid: N/A
Surf. Casing: 4" CARBON STEEL

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+2.5	-5	C
-5	-25	S
-25	-26	SUMP

Casing C1: PROTECT. CASING -SURFACE to +3 FT.
C2: 2" SS RISER +2.5' to -5'
Screen S1: #10 SLOT -5' to -25'
Sump: -25' to -26'
Centralizers:
Filter Matl.: 6/20 SAND -4' to -29'
Cement: PORTLAND TYPE 1 BENTONITE MIX -SURFACE to -3'
Other: 1/4" BENTONITE PELLETS -3' to -4'

CONSTRUCTION TIME LOG

TASK	START Date	START Time	FINISH Date	FINISH Time
Drilling:	15DEC93	1330	15DEC93	1500
Geophys. Logging:				
Casing: RISER	15DEC93	1500	15DEC93	1530
Geophys. Logging:				
Casing: PROTECTIVE	15DEC93	1530	15DEC93	1620
Filter Placement:	15DEC93	1500	15DEC93	1530
Cementing:	15DEC93	1530	15DEC93	1620
Development:	16DEC93	1430	16DEC93	1530

WELL DEVELOPMENT

	pH	TEMP (°C)	SP.COND. µmhos
Initial	7.2	29	36,000
After Surging	7.2	29	40,000
During Bailing	7.2	29	46,000
During Bailing	7.2	29	47,000
During Pumping	7.2	29	>50,000
During Pumping	7.1	29	>50,000
During Pumping	7.1	29	>50,000
During Pumping	7.1	29	>50,000

COMMENTS

DUE TO HEAVING OF SANDS, SAMPLING WAS DISCONTINUED AT 12 FEET; SUMP WAS SET AT -27.5 FT.; SANDS HEAVED UPWARD FROM -29 FT.; THE REMAINDER OF THE SPACE BETWEEN THE BOTTOM OF THE SUMP AND THE BOTTOM OF THE BORING WAS FILLED WITH SAND.

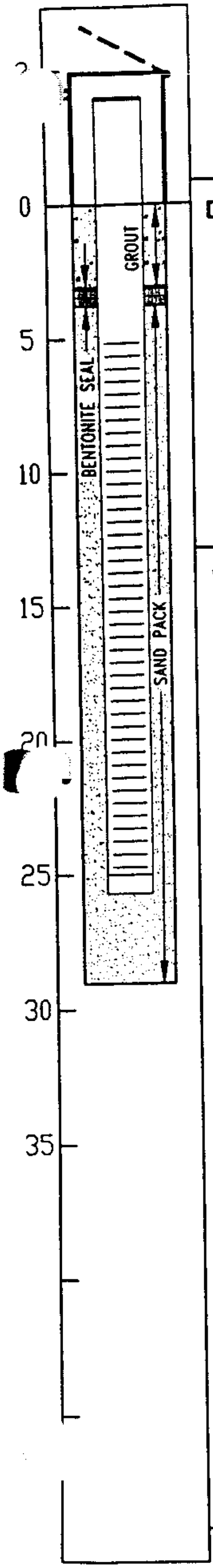
FIGURE C-6

GDC

WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. WL-3
Top/Pad Elev. 6.51
TOC Elev. 8.22

Location or Coords. (survey data pending)



DRILLING SUMMARY

Tot. Depth 29'
Borehole Dia. 8"
Driller CARIBBEAN SOIL TESTING
Rig ACKER
Bit(s) HOLLOW STEM
Drilling Fluid N/A
Surf. Casing 4" CARBON STEEL

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+2.5 - -5	C	
-5 - -25	S	
-25 - -26	SUMP	

Casing C1 PROTECT. CASING -SURFACE to +3 FT.
C2 2" SS RISER +2.5' to -5'
Screen S1 #10 SLOT -5' to -25'
Sump -25' to -26'
Centralizers
Filter Matl. 6/20 SAND -4' to -29'
Cement PORTLAND TYPE 1 BENTONITE MIX -SURFACE TO -3'
Other 1/4" BENTONITE PELLETS -3' to -4'

CONSTRUCTION TIME LOG

TASK	START Date	START Time	FINISH Date	FINISH Time
Drilling:	15DEC93	0755	15DEC93	1100
Geophys. Logging:				
Casing: RISER	15DEC93	1100	15DEC93	1200
Geophys. Logging:				
Casing: PROTECTIVE	15DEC93	1545	15DEC93	1630
Filter Placement:	15DEC93	1115	15DEC93	1200
Cementing:	15DEC93	1545	15DEC93	1630
Development:	16DEC93	1535	16DEC93	1645

WELL DEVELOPMENT

	pH	TEMP (°C)	SP.COND. µmhos
Initial	6.9	29	46,000
After Surging	6.9	29	45,000
During Bailing	6.8	29	46,000
During Bailing	6.8	29	47,000
During Pumping	6.8	29	47,000
During Pumping	6.8	29	47,000
During Pumping	6.8	29	47,000
During Pumping	6.8	29	47,000

COMMENTS

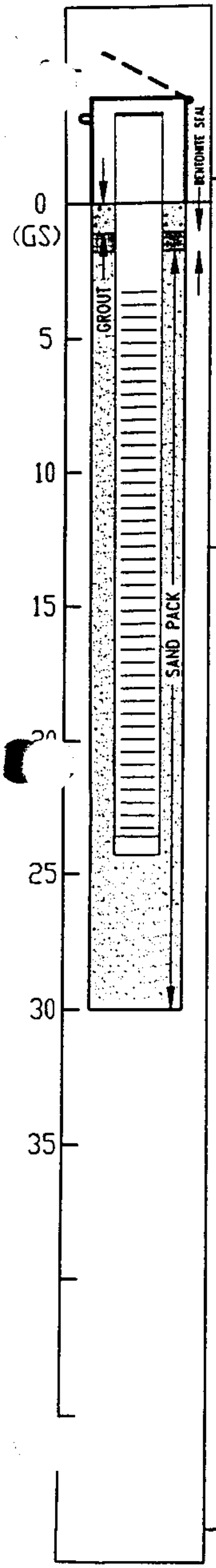
DUE TO HEAVING OF SANDS, SAMPLING DISCONTINUED AT 12 FEET. SUMP WAS SET AT 27.5 FT. SANDS HEAVED UPWARD FROM 29 FT.; THE REMAINDER OF THE SPACE BETWEEN THE BOTTOM OF THE SUMP AND THE BOTTOM OF THE BORING WAS FILLED WITH SAND.
VERY STRONG ORGANIC ODOR IN SOILS AND GROUNDWATER.

FIGURE C-7

GDC

WELL CONSTRUCTION SUMMARY

Proj. No. 93-562
Well No. WL-4
Location or Coords. (survey data pending)
Top/Pad Elev. 5.55
TOC Elev. 7.29



DRILLING SUMMARY

Tot. Depth 30'
Borehole Dia. 8"
Driller CARIBBEAN SOIL TESTING
Rig ACKER
Bit(s) HOLLOW STEM
Drilling Fluid N/A
Surf. Casing 4" CARBON STEEL

WELL DESIGN

Basis: Geologic Log X
Geophysical Log

Casing String(s): C=Casing S=Screen

+2 – -3	C
-3 – -23	S
-23 – -24	SUMP

Casing C1 PROTECT. CASING -SURFACE to +2.5 FT.
C2 2" SS RISER +2' to -3'
Screen S1 #10 SLOT -3' to -23'
Sump -23' to -24'
Centralizers
Filter Matl. 6/20 SAND -2' to -30'
Cement PORTLAND TYPE 1 BENTONITE MIX-SURFACE to -1'
Other 1/4" BENTONITE PELLETS -1' to -2'

CONSTRUCTION TIME LOG

TASK	START Date	START Time	FINISH Date	FINISH Time
Drilling:	14DEC93	1015	14DEC93	1315
Geophys. Logging:				
Casing: RISER	14DEC93	1315	14DEC93	1420
Geophys. Logging:				
Casing: PROTECTIVE	14DEC93	1430	14DEC93	1500
Filter Placement:	14DEC93	1315	14DEC93	1430
Cementing:	14DEC93	1430	14DEC93	1500
Development:	16DEC93	1315	16DEC93	1430

WELL DEVELOPMENT

	pH	TEMP (°C)	SP.COND. µmhos
Initial	7.9	29	10,000
After Surging	7.9	29	11,000
During Bailing	7.9	29	12,000
During Bailing	7.9	29	14,000
During Pumping	7.8	29	15,000
During Pumping	7.7	29	17,000
During Pumping	7.7	29	20,000
During Pumping	7.7	29	21,000
During Pumping	7.7	29	21,000

COMMENTS

DUE TO HEAVING OF SANDS AND GRAVELS, SAMPLING DISCONTINUED AT 10 FEET. GROUNDWATER ENCOUNTERED AT 4 FEET; SCREEN SET AT 3 FEET INSTEAD OF 2 FEET ROAD FILL 0-4 FT. (NO SAMPLE); PROTECTIVE CASING WAS CUT TO ACCOMODATE THE 2 FT. RISER STICK-UP.

FIGURE C-8

GDC

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY — Well/Boring Designation: PD-1 — Page: 1 of 1

Location: PENUELAS, PUERTO RICO — Date drilled: 05-24-94

T.O.C. 2.29m — G.L. 1.43m — Cement Interval: 0'@2' — Type: Concrete & Earth

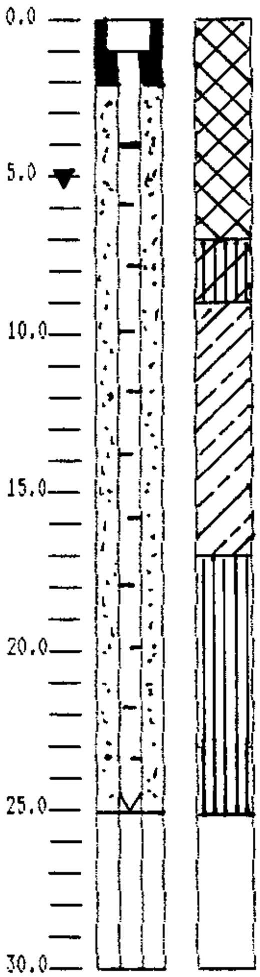
Seal Interval: 0'@2' — Type: Bentonite (Pellets) — Filter pack Interval: 2'@25' — Type: Gravel

Casing Interval: 0@4' — Length 4'-0" — Dia. 2.0" ID — Type: PVC SCH. 40

Screen Interval: 4'@24' — Length 20'-0" — Slot 0.020" — Type: PVC SCH. 40 Wire Wrap — Sump: 12"

Driller: J.L. Morales — Contractor: SOIL-TECH — Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
21	15	CL		S1	8"	SILTY CLAY AND LIMESTONE GRAVEL, TRACE FINE SAND, STIFF, DARK BROWN/VERY PALE ORANGE/YELLOWISH BROWN. (FILL)
20	8			S2	11"	DO
48	2	CL/PT		S3	3"	SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND, OCC. PEBBLES AND PEAT INCLUSSIONS - SOFT - GRAY/DARK BROWN.
91	W/H	CL		S4	6"	ORGANIC SILTY CLAY, OCC. DECAYED PARTICLES AND SHELLS FRAGMENTS, VERY SOFT, BLACK/WHITE MOTTLED.
76	1			S5	10"	
65	W/H			S6	24"	DO
65	W/H			S7	24"	DO
37	2	CL		S8	24"	CLAYEY SILT, TRACE TO LITTLE FINE SAND, OCC. SHELL AND CORAL FRAGMENTS, SOFT TO MEDIUM, LIGHT BLUISH GRAY.
29	2			S9	24"	DO
23	6			S10	18"	DO
						END OF BORING AT

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted

DSM Project #1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY | Well/Boring Designation : PD-2 | Page: 1 of 1

Location : PENUELAS, PUERTO RICO | Date drilled: 05-20-94

T.O.C. 3.57m | G.L. 2.86m | Cement Interval: 0'@1' | Type: Concrete & Earth

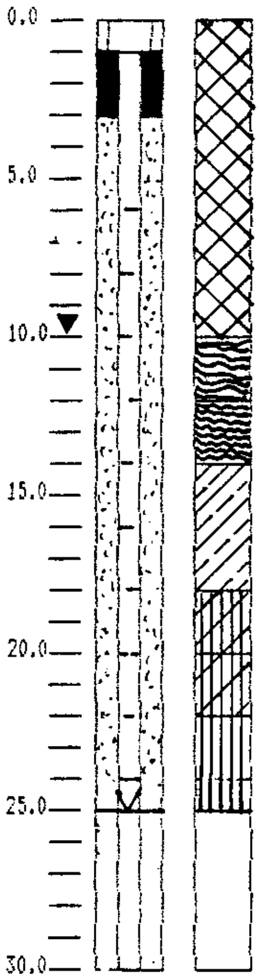
Seal Interval: 1@3' | Type: Bentonite (Pellets) | Filter pack Interval: 3'@ 25' | Type: Gravel

Casing Interval: 0@5' | Length 5'-0" | Dia. 2.0" ID | Type: PVC SCH. 40

Screen Interval: 5 @ 25' | Length 20'-0" | Slot 0.020" | Type: PVC SCH.40 Wire Wrap | Sump: 12"

Driller: O. Garcia | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
13	14			S1	11"	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, STIFF TO VERY STIFF, YELLOWISH BROWN/WHITE MOTTLED. (FILL)
16	21	CL		S2	6"	DO
98	1	ML/CL		S3	24"	ORGANIC SILTY CLAY, TRACE FINE SAND AND PEAT INCLUSSIONS, VERY SOFT, DARK GRAY/DARK BROWN.
149	3	PT		S4	24"	PEAT, SOFT, DARK BROWN
32	1	CL		S5	24"	SLIGHTLY ORGANIC SILTY CLAY AND PEAT INCLUSSIONS, TRACE FINE SAND, VERY SOFT TO STIFF, DARK OLIVE GRAY/DARK BROWN SPOTS.
23	9			S6	24"	
30	3	ML		S7	24"	CLAYEY SILT, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, SOFT, OLIVE/LIGHT GRAY
26	6	CL		S8	24"	SILTY CLAY, TRACE FINE SAND, MEDIUM, YELLOWISH BROWN
24	8	CL		S9	24"	FINE TO MEDIUM SANDY SILT, OCC. CEMENTED SAND, STIFF, YELLOWISH BROWN.

END OF BORING AT 25.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-3 Page: 1 of 1

Location : PENUELAS, PUERTO RICO Date drilled: 05-20-94

T.O.C. 3.17m G.L. 2.28m Cement: Interval 0'@1' Type: Concrete & Earth

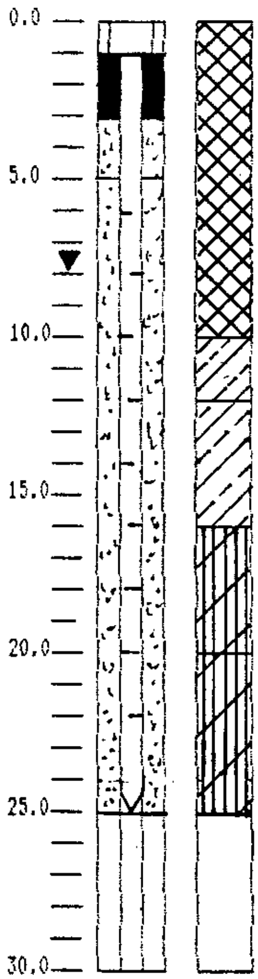
Seal Interval: 1@3' Type: Bentonite (Pellets) Filter pack Interval: 3@25' Type: Gravel

Casing Interval: 0@5' Length 5'-0" Dia. 2.0' ID Type: PVC, SCH. 40

Screen Interval: 5'@25' Length 20'-0" Slot 0.020" Type: PVC, SCH. 40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PL	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
17	29	CL		S1	15"	SILTY CLAY, TRACE FINE SAND AND LIMESTONE GRAVEL, VERY STIFF TO HARD, YELLOWISH BROWN/VERY PALE ORANGE (FILL)
21	5			S2	11"	DO
125	W/H	CL/PT		S3	24"	ORGANIC SILTY CLAY, TRACE FINE SAND, VERY SOFT, DARK BROWN.
53	W/H	CL/PT		S4	24"	ORGANIC SILTY CLAY AND PEAT INCLUSSIONS,TRACE FINE SAND, VERY SOFT, DARK GRAY/BROWN SPOTS.
53	W/H			S5	24"	
33	9	ML/CL		S6	24"	SLIGHTY ORGANIC SILTY CLAY, TRACE FINE SAND, OCC. PEAT INCLUSSIONS, STIFF, GRAY/OLIVE YELLOW.
29	8			S7	22"	
25	5	ML/CL		S8	24"	SILTY CLAY, TRACE FINE SAND AND LIMESTONE GRAVEL, MEDIUM TO SOFT, DARK YELLOWISH-BROWN.
25	2			S9	20"	

END OF BORING AT 25.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY   Well/Boring Designation : PD-4   Page: 1 of 1

Location : PENUELAS, PUERTO RICO   Date drilled: 05-18-94

T.O.C. 3.46m   G.L. 2.59m   Cement: Interval 0'@1' Type: Concrete & Earth

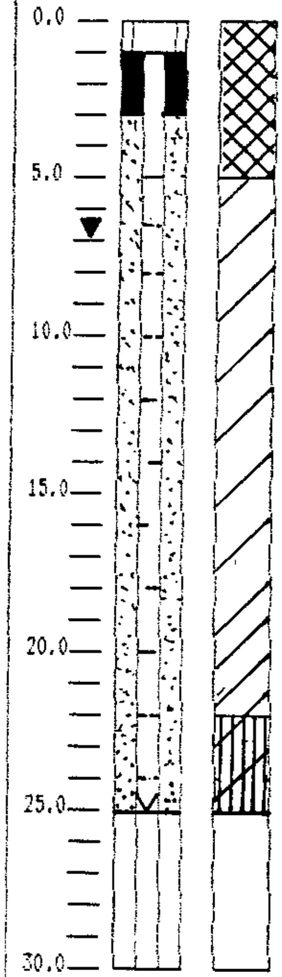
Seal Interval: 1'@3'   Type: Bentonite (Pellets)   Filter pack Interval: 3'@25'   Type: Gravel

Casing Interval: 0@5'   Length 5'-0"   Dia. 2.0" ID   Type: PVC SHC. 40

Screen Interval: 20'@25'   Length 20'-0"   Slot 0.020"   Type: PVC SCH.40 Wire Wrap   Sump: 12"

Driller: O. Garcia   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
16	17	CL		S1	14"	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, VERY STIFF, OLIVE BROWN/ YELLOW. (FILL)
18	5			S2	15"	ORGANIC CLAYEY SILT, TRACE FINE SAND, OCC. PEAT INCLUSSIONS AND LIMESTONE GRAVEL, VERY SOFT TO MEDIUM, DARK GRAY, STRONG ODOR TO HYDROCARBONS.
41	1	CH	48.0	S3	22"	DO
78	2			S4	20"	DO
47	W/H			S5	24"	DO
51	W/H	CH	39.1	S6	5"	DO
36	3			S7	12"	
34	4	CL	23.3	S8	24"	
23	5	CL		S9	24"	SLIGHTLY ORGANIC SILTY CLAY AND POCKETS OF LIMESTONE GRAVEL, TRACE FINE SAND, OCC. PEBBLES, MEDIUM, DARK OLIVE GRAY/WHITE.

END OF BORING AT 25.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-5 Page: 1 of 1

Location : PENUELAS, PUERTO RICO Date drilled: 05-17-94

T.O.C. 2.70m G.L. 1.90m Cement Interval: 0'@1' Type: Concrete & Earth

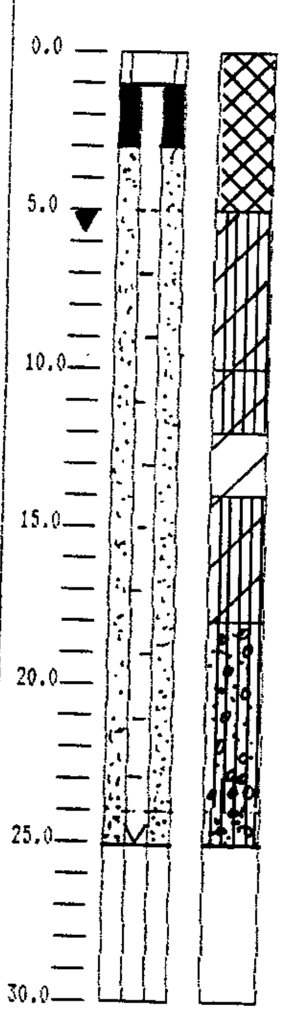
Seal Interval: 1'@3' Type: Bentonite (Pellets) Filter pack Interval: 3'@25' Type: Gravel

Casing Interval: 0@5' Length 5'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 5'@25' Length 20'-0" Slot 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
8	30			S1	5"	SILTY CLAY, TRACE TO LITTLE FINE SAND AND LIMESTONE GRAVEL, VERY STIFF, YELLOWISH BROWN/VERY PALE ORANGE. (FILL)
29	4	CL		S2	22"	SLIGHTY ORGANIC SILTY CLAY, TRACE FINE SAND, SOFT, DARK OLIVE BROWN/GRAY.
23	8	CL		S3	18"	SILTY CLAY AND LIMESTONE PEBBLES, TRACE FINE SAND, STIFF, GRAY.
28	11	CL		S4	13"	CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, STIFF, YELLOWISH BROWN.
27	7	CL/ML		S5	18"	CLAYEY SILT, TRACE TO LITTLE FINE SAND, OCC. PEBBLES, MEDIUM, YELLOWISH BROWN/BROWN.
21	10			S6	22"	
18	7			S7	24"	FINE SANDY SILT, OCC. LIMESTONE GRAVEL, MEDIUM DARK YELLOWISH BROWN.
26	3	ML		S8	24"	DO
27	7			S9	24"	DO

END OF BORING AT 25.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted

DSM Project #1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY   Well/Boring Designation : PD-6   Page: 1 of 1

Location : PENUELAS, PUERTO RICO   Date drilled: 05-17-94

T.O.C. 3.43m   G.L. 2.74m   Cement: Interval 0'@1"   Type: Concrete & Earth

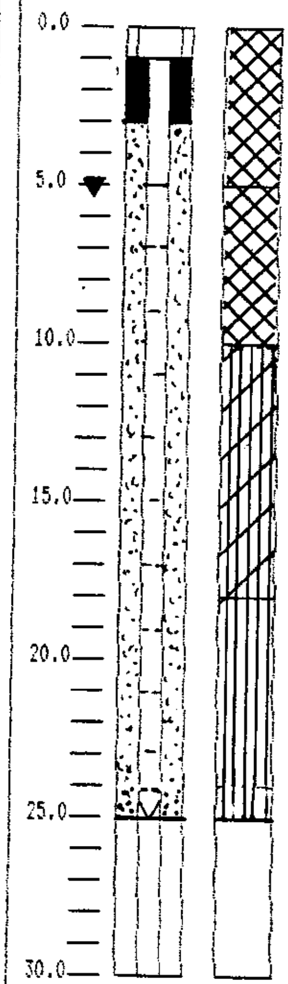
Seal Interval: 1@3'   Type: Bentonite (Pellets)   Filter pack Interval: 3'@25'   Type: Gravel

Casing Interval: 0@5'   Length 5'-0"   Dia. 2.0" ID   Type: PVC SCH. 40

Screen Interval: 5'@25'   Length 20-0"   Slot 0.020"   Type: PVC SCH.40 Wire Wrap   Sump: 12"

Driller: O. Garcia   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
13	9	CL		S1	7"	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, STIFF, BROWN/WHITE MOTTLED. (FILL)
27	W/H	CL		S2	14"	CLAYEY SILT, TRACE TO LITTLE VERY FINE SAND, VERY SOFT, GRAYISH BROWN. (PROBABLY FILL)
32	5	CH		S3	20"	SILTY CLAY, TRACE FINE SAND, DECAYED THIN ROOTS, OLIVE BROWN/GRAY OCC. BLACK SEAMS.
34	9			S4	15"	DO
30	11			S5	17"	DO
24	9			S6	24"	DO
37	W/H	CL/ML		S7	24"	CLAYEY SILT, TRACE TO LITTLE FINE SAND, SOFT TO MEDIUM, DARK YELLOWISH BROWN/GRAY.
30	5			S8	21"	DO
26	4			S9	24"	DO
						END OF BORING AT 25.0'

(a) = Information not submitted

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-7 Page: 1 of 1

Location : PENUELAS, PUERTO RICO Date drilled: 05-16-94

T.O.C. 3.91m G.L. 3.17m Cement: Interval 0'@1' Type: Concrete & Earth

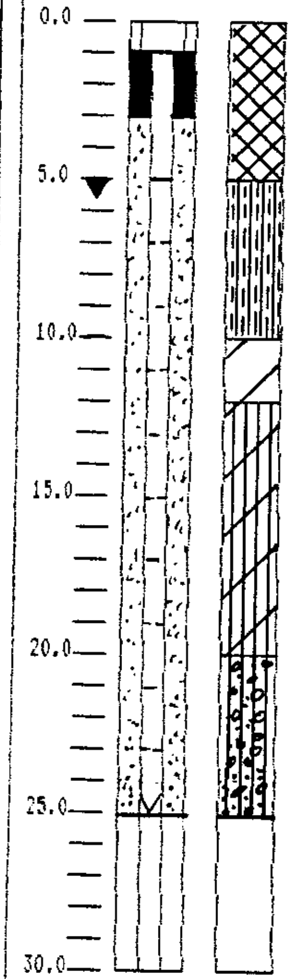
Seal Interval: 1'@3' Type: Bentonite (Pellets) Filter pack Interval: 3'@25' Type: Gravel

Casing Interval: 0@5.0' Length 5'-0" Dia. 2.0" ID Type: PVC SCH.40

Screen Interval: 5@25' Length 20'-0" Slot 0.02" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
5	16			S1	7"	SILTY CLAY AND LIMESTONE GRAVEL, TRACE FINE SAND, VERY STIFF, YELLOWISH BROWN/VERY PALE ORANGE. (FILL)
25	1	ML		S2	8"	ORGANIC SILT, TRACE TO LITTLE FINE SAND, VERY SOFT, DARK GRAY.
24	8	CL		S3	14"	CLAY, TRACE FINE SAND, OCC. LIMESTONE PEBBLES, STIFF, REDDISH BROWN/ WHITE MOTTLED.
27	13	CL		S4	22"	SILTY CLAY, TRACE FINE SAND, STIFF, YELLOWISH BROWN/GRAY
31	14			S5	24"	DO
26	13			S6	24"	DO
24	12			S7	17"	DO
20	12	ML		S8	18"	FINE SANDY SILT, OCC LIMESTONE GRAVEL, STIFF TO MEDIUM, YELLOWISH BROWN.
27	4			S9	24"	DO
						END OF BORING AT 25.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted

DSM Project #1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-8 Page: 1 of 1

Location : PENUELAS, PUERTO RICO Date drilled: 05-12-94

T.O.C. 4.41m G.L. 3.61m Cement: Interval 0'@1' Type: Concrete & Earth

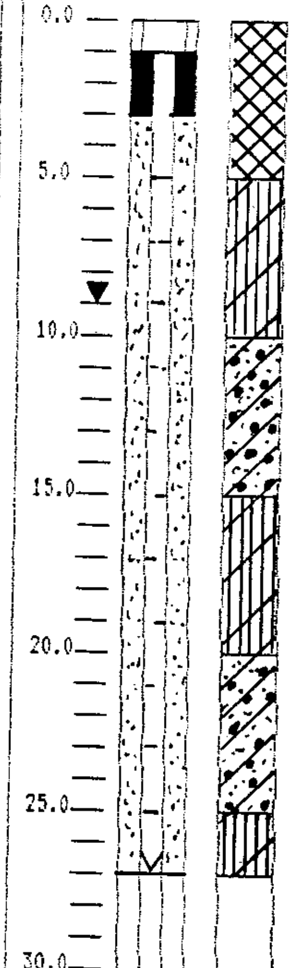
Seal Interval: 1@3' Type: Bentonite (Pellets) Filter pack Interval: 3'@27' Type: Gravel

Casing Interval: 0'@5' Length 5'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 5'@25' Length 20'-0" Slot .020" Type: PVC SCH. 40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
14	12			S1	13"	CLAY AND LIMESTONE GRAVEL, TRACE FINE SAND, STIFF, BROWN/VERY PALE ORANGE. (FILL)
26	3	CL		S2	14"	SILTY CLAY, TRACE FINE SAND, SOFT, DARK OLIVE BROWN.
20	12	CL		S3	15"	SILTY CLAY SAND, OCC. LIMESTONE GRAVEL, MEDIUM, OLIVE GRAY.
18	10	CL		S4	12"	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, STIFF, GRAYISH BROWN/YELLOWISH BROWN/OCC. GRAY MOTTLED.
21	17	CH		S5	20"	FINE TO COARSE SAND, TRACE SILT AND LIMESTONE GRAVEL, THIN BEDDED SAND/CLAY, MEDIUM, PALE YELLOW.
11	30	CH		S6	22"	CLAY AND SILT, CHALKY LIMESTONE POCKETS, TRACE FINE SAND, HARD, YELLOWISH BROWN/WHITE. (b)

END OF BORING AT 27.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone gravel, most probably.

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-9 Page: 1 of 3

Location : PENUELAS, PUERTO RICO Date drilled: 05-25-94

T.O.C. 17.30m G.L. 16.35m Cement: Interval 0'@47' Type: Concrete & Earth

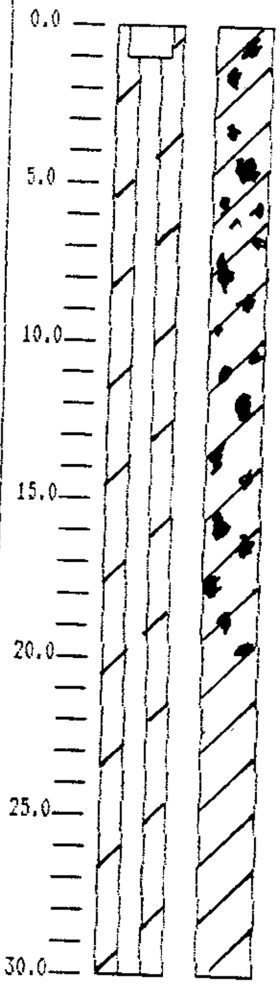
Seal: Interval 47@49' Type: Bentonite (Pellets) Filter pack Interval: 49'@71' Type: Gravel

Casing Interval: 0@51' Length 51'-0" Dia. 2.0" ID Type: PVC SCH.40

Screen Interval: 51'@71' Length 20'-0" Slot 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12"

Driller: J. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



wZ	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
2	27			S1	12"	FINE TO COARSE LIMESTONE GRAVEL IN A SILTY CLAY MATRIX. TRACE FINE SAND, VERY STIFF TO HARD, PALE ORANGE/YELLOW/YELLOWISH BROWN. (b)
3	18			S2	16"	DO
10	47	GC	24.8	S3	14"	DO
7.6	46			S4	13"	DO
18	46	CL	20.0	S5	15"	DO
11	62			S6	16"	DO

wZ - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-9 Page: 3 of 3

Location : PENUELAS, PUERTO RICO Date drilled:

T.O.C. 17.30m G.L. 16.35m Cement Interval: 0'@47' Type: Concrete & Earth

Seal Interval: 47'@49' Type: Bentonite (Pellets) Filter pack: Interval: 49@71' Type: Gravel

Casing Interval: 0@51' Length 51'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 51'@71' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: J. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY

Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
60.0	20	84/10		9.7	S13	13"	FINE TO COARSE LIMESTONE GRAVEL IN A SILTY CLAY MATRIX, FEW MEDIUM SAND, HARD, VERY PALE ORANGE/YELLOWISH BROWN RED. (b)
	23	38			S14	24"	DO
65.0	22	64			S15	24"	DO
	19	38		19.6	S16	24"	DO
	29	33			S17	24"	
70.0							END OF BORING AT 71.0'
75.0							
80.0							
85.0							
90.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-9 | Page: 2 of 3

Location : PENUELAS, PUERTO RICO | Date drilled: 05-25-94

T.O.C. 17.30m | G.L. 16.35m | Cement Interval: 0'@47' | Type: Concrete & Earth

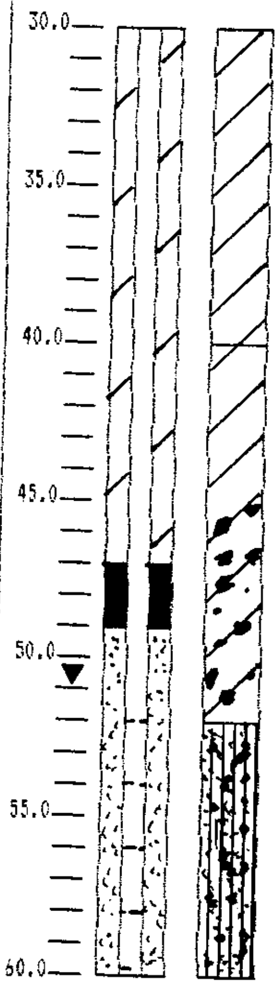
Seal Interval: 47'@49' | Type: Bentonite (Pellets) | Filter pack Interval: 49'@71' | Type: Gravel

Casing Interval: 0@51' | Length 51'-0" | Dia. 2.0" ID | Type: PVC SCH.40

Screen: Interval 51'@71' | Length 20'-0" | Slot 0.020" | Type: PVC SCH.40 Wire Wrap | Sump: 12"

Driller: J. Morales | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
7.9	75	CL	19.0	S7	18"	DO
20	50/6			S8	12"	DO
20	42	CL	18.2	S9	17"	CLAY, LITTLE SILT AND LIMESTONE GRAVEL, TRACE FINE SAND, HARD, YELLOWISH BROWN/YELLOW. (b)
9	74/10	GC	29.2	S10	13"	DO
15	61	CH	53.4	S11	24"	DO
15	88/10		12.4	S12	17"	FINE TO COARSE LIMESTONE GRAVEL AND FINE TO MEDIUM SILTY SAND, CLAY POCKETS, VERY DENSE, YELLOWISH BROWN. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone most probably

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILTY — Well/Boring Designation : PD-10 — Page: 1 of 2

Location : PENUELAS, PUERTO RICO — Date drilled: 05-26-94

T.O.C. 12.15m — G.L. 11.14m — Cement Interval: 0@24' — Type: Concrete & Earth

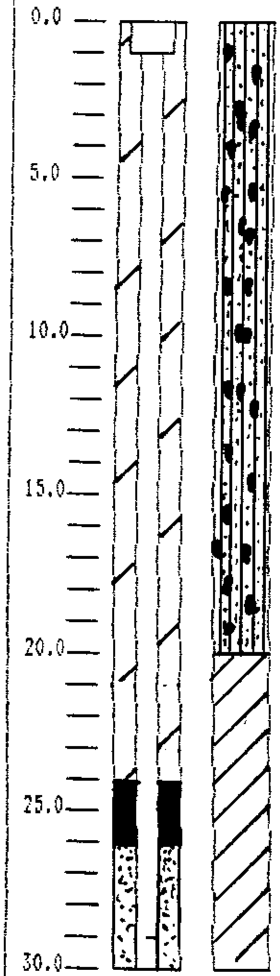
Seal Interval: 24'@26' — Type: Bentonite (Pellets) — Filter pack Interval: 26'@48' — Type: Gravel

Casing Interval: 0@27' — Length 27'-0" — Dia. 2.0" ID — Type: PVC SCH.40

Screen Interval 27'@47' — Length 20'-0" — Slot .020" — Type: PVC SCH.40 Wire Wrap — Sump: 12"

Driller: J.L. Morales — Contractor: SOIL-TECH — Logged by: Victor E. Rivera Associates

LITHOLOGY



wX	N	Group Sym.	PI	Samp. Num.	Samp. Rec.		Group Name/Lithology Remarks
14	26	--	--	S1	17"		LIMESTONE GRAVELLY CLAYEY SILT
15	31	--	--	S2	18"	DO	
10	32	--	--	S3	22"	DO	
12	24			S4	15"	DO	
18	16	CL	16.1	S5	19"	DO	
14	28	--	--	S6	17"		

wX - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY   Well/Boring Designation : PD-10

Location : PENUELAS, PUERTO RICO   Date drilled: 05-26-94

T.O.C. 12.15m   G.L. 11.14m   Cement: Interval 0'@24' Type: Concrete & Earth

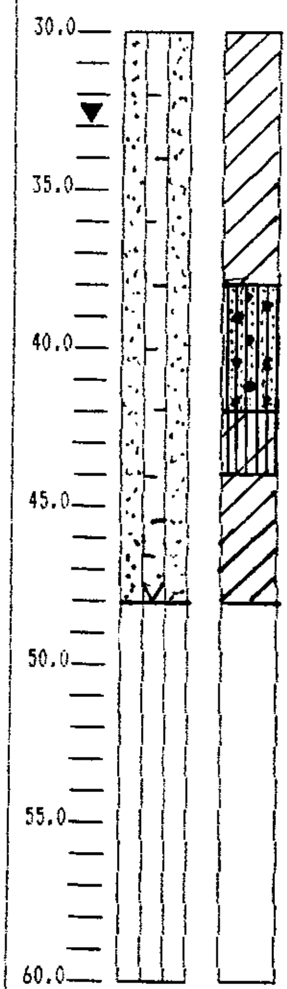
Seal Interval: 24'@26'   Type: Bentonite (Pellets)   Filter pack Interval: 26'@48'   Type: Gravel

Casing Interval: 0@27'   Length 27'-0"   Dia. 2.0" ID   Type: PVC SCH. 40

Screen Interval: 27'@47'   Length 20'-0"   Slot 0.020"   Type: PVC SCH.40 Wire Wrap   Sump: 12"

Driller: J.L. Morales   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
18	15	GC	11.0	S7	8"	DO
19	28	--	--	S8	22"	DO
21	48	SMSC	5.7	S9	24"	DO
20	63	--	--	S10	24"	DO
13	62	CLML	5.9	S11	24"	DO
13	78	CL	9.6	S12	24"	DO
19	84	GC	9.8	S13	24"	DO

END OF BORING AT 48.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathred tertiary limestone, most probably.

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-12 Page: 1 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-01-94

T.O.C. 9.98m G.L. 9.01m Cement Interval: 0'@18' Type: Concrete & Earth

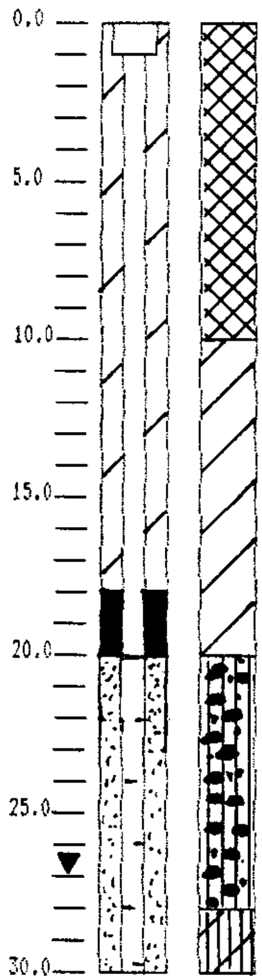
Seal Interval: 18'@20' Type: Bentonite (Pellets) Filter pack Interval: 20'@42' Type: Gravel

Casing Interval: 0@22' Length 22'-0" Dia. 2.0" ID Type: PVC SCH.40

Screen Interval: 22'@42' Length 20'-0" Slot 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
5	23	--	--	S1	13"	CLAYEY SILT, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, STIFF TO VERY STIFF, YELLOWISH BROWN. (PROBABLE FILL)
10	14	--	--	S2	7"	DO
20	11	--	--	S3	14"	SILTY CLAY, SOME FINE SAND, OCC. LIMESTONE GRAVEL, STIFF, DARK BROWN, REDDISH YELLOW/ PALE YELLOW. (b)
21	16	CH	49.08	S4	20"	DO
12	61	GM	2.8	S5	24"	FINE TO MEDIUM SAND, LIMESTONE GRAVEL AND SILTY CLAY, VERY DENSE, OLIVE YELLOW/YELLOW. (b)
14	35	GM	4.2	S6	21"	DO
19	20	CL	24.9	S7	24"	SILTY CLAY AND FINE SAND, OCC. FINE GRAVEL, VERY STIFF, YELLOWISH RED. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-12 Page: 2 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-01-94

T.O.C. 9.98m G.L. 9.01m Cement: Interval 0'@18' Type: Concrete & Earth

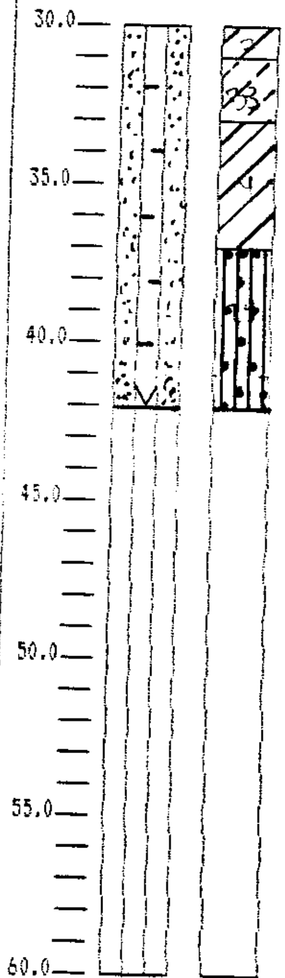
Seal Interval: 18'@20' Type: Bentonite (Pellets) Filter pack Interval: 20'@42' Type: Gravel

Casing Interval: 0@22' Length 22'-0" Dia. 2.0" ID Type: PVC SCH.40

Screen Interval: 22'@42' Length 20'-0" Slot 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
31	42	GC	17.4	S8	15"	FINE TO MEDIUM CLAYEY SAND, OCC. LIMESTONE GRAVEL, VERY DENSE, YELLOWISH BROWN. (b)
26	26	--	--	S9	20"	
31	36	GC	21.4	S10	24"	CLAY, TRACE FINE SAND, OCC. PEBBLES, VERY STIFF, REDDISH YELLOW. (b)
15	19	SC	14.3	S11	24"	SILTY CLAY, SOME FINE SAND, OCC. FINE LIMESTONE GRAVEL, VERY STIFF TO HARD, PALE YELLOW/REDDISH YELLOW. (b)
9	45	--	--	S12	18"	
6	74	--	--	S13	19"	FINE TO MEDIUM SAND AND GRAVEL, TRACE SILT, DENSE, LIGHT BROWNISH GRAY. (b)

END OF BORING AT 42.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thorought weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-13 | Page: 1 of 1

Location : PENUELAS, PUERTO RICO | Date drilled: 06-02-94

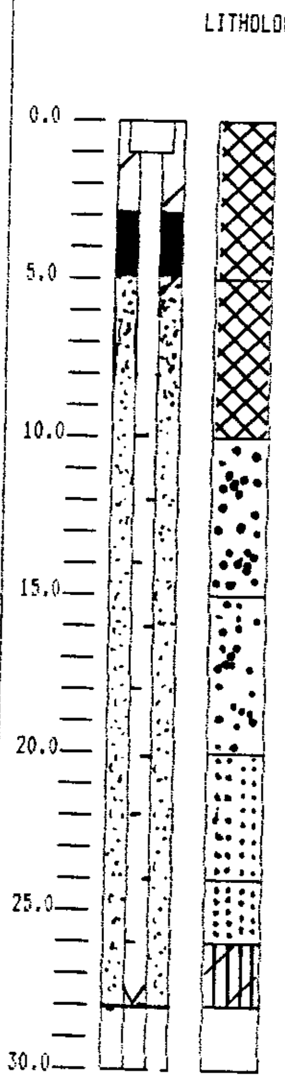
T.O.C. 10.22m | G.L. 9.22m | Cement Interval: 0'@3' | Type: Concrete & Earth

Seal Interval: 3'@5' | Type: Bentonite (Pellets) | Filter pack Interval: 5@28' | Type: Gravel

Casing Interval: 0@7' | Length 8'-0" | Dia. 2.0" ID | Type: PVC SCH.40

Screen Interval: 7'@27' | Length 20'-0" | Slot 0.020" | Type: PVC SCH.40 Sump: 12" Wire Wrap

Driller: O. Garcia | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
14	16	--	--	S1	8"	CLAYEY SILT AND CONCRETE DEBRIS, TRACE FINE SAND, VERY STIFF, YELLOW/BROWN (FILL)
12	16	--	--	S2	14"	FINE TO MEDIUM LIMESTONE GRAVEL AND FINE TO COARSE SAND, TRACE SILT, MEDIUM LOOSE, VERY PALE ORANGE/YELLOWISH BROWN. (PROBABLE FILL)
12	39	GP	NP	S3	13"	FINE TO COARSE LIMESTONE GRAVEL, OCC. SILTY SAND, DENSE, VERY PALE ORANGE/DARK GRAY/YELLOWISH BROWN, SLIGHT TO MODERATE ODOR TO HYDROCARBON. (b)
16	28	GP	NP	S4	18"	LIMESTONE GRAVEL AND FINE SAND, TRACE SILT, MEDIUM DENSE, YELLOWISH BROWN, SLIGHT TO MODERATE ODOR TO HYDROCARBON (b)
14 23	46 50/6	SW	6.5	S5 S6	24" 5"	FINE SAND AND LIMESTONE GRAVEL, TRACE CLAY, VERY DENSE, DARK YELLOWISH BROWN/GRAY. S5=SW (SM-SE) (b)
22	11	SW	5.3	S7	24"	FINE TO MEDIUM SAND AND LIMESTONE GRAVEL, TRACE SILT, MEDIUM, GRAY. S7 = SW (SM-SC)
21	15	--	--	S8	20"	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, VERY STIFF, YELLOWISH BROWN.

END OF BORING @ 28'-0"

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-14 Page: 2 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-02-94

T.O.C. 10.75m G.L. 9.97m Cement Interval: 0'@19' Type: Concrete & Earth

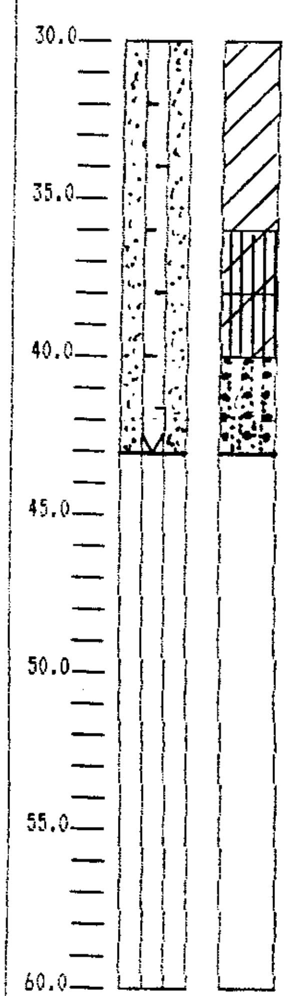
Seal Interval: 19'@21' Type: Bentonite (Pellets) Filter pack Interval: 21'@48' Type: Gravel

Casing Interval: 0@23' Length 23'-0" Dia. 2.0" ID Type: PVC SCH.40

Screen Interval: 23'@43' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
16	26	CL	21.5	S7	19"	SILTY CLAY, TRACE FINE SAND, OCC., LIMESTONE PEBBLES, VERY STIFF TO HARD, YELLOWISH RED/GRAY/ WHITE MOTTLED. (b)
23	27	--	--	S8	20"	DO
32	26	--	--	S9	24"	DO
21	63/7	--	--	S10	8"	SILTY CLAY, TRACE TO LITTLE FINE SAND, VERY HARD, VERY PALE BROWN/YELLOW BROWN. (b)
22	6	--	--	S11	10"	SILTY CLAY, OCC. LIMESTONE GRAVEL, TRACE FINE SAND, MEDIUM, LIGHT GRAY. (b)
11	42		NP	S12	11"	FINE TO COARSE SAND, DENSE, DARK BROWN/PALE YELLOW. (b)

END OF BORING AT 43.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USSC)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-15 Page: 1 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 05-08-94

T.O.C. 10.52m G.L. 10.54m Cement: Interval 0'@22' Type: Concrete & Earth

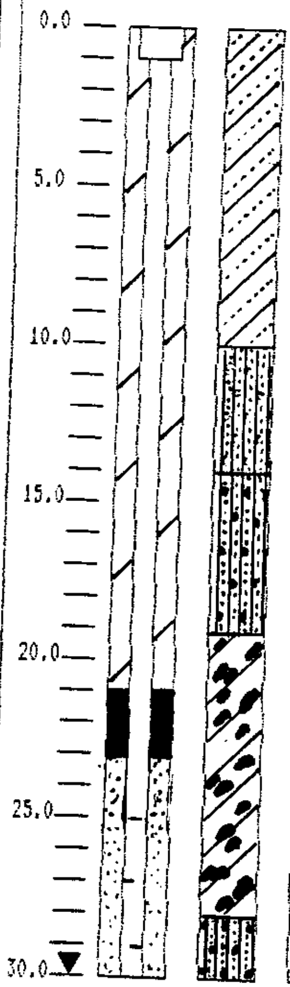
Seal Interval: 22'@24' Type: Bentonite (Pellets) Filter pack Interval: 24'@45' Type: Gravel

Casing Interval: 0@25' Length 25'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 25'@45' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
9	21	--	--	S1	17"	SILTY CLAY AND LIMESTONE GRAVEL, TRACE FINE SAND, VERY STIFF TO HARD, BROWN/YELLOWISH BROWN/VERY PALE ORANGE (b)
11	36	--	--	S2	19"	DO
11	50/3	SM	NP	S3	4"	FINE TO MEDIUM LIMESTONE GRAVEL/FINE SANDY SILT, OCC. CLAY LUMPS, DENSE TO VERY DENSE, VERY PALE/ORANGE/YELLOWISH BROWN YELLOWISH RED (b)
13	47	SP-SM	NP	S4	18"	DO
14	22	GC	8.5	S5	16"	DO
16	50/4	--	--	S6	2"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-16 Page: 1 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-07-94

T.O.C. 12.40m G.L. 11.41m Cement: Interval 0@28' Type: Concrete & Earth

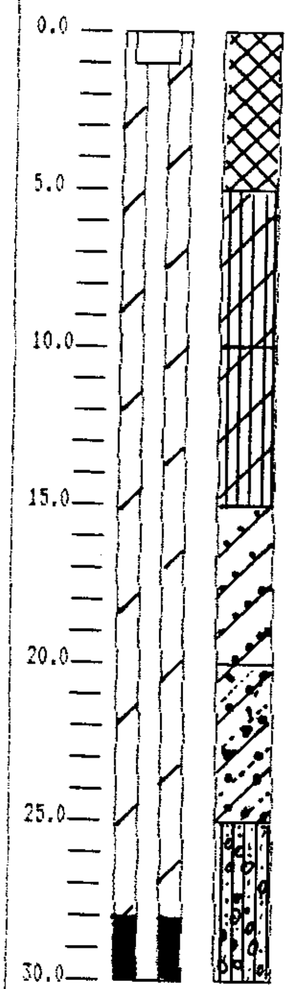
Seal Interval: 28'@30' Type: Bentonite (Pellets) Filter pack Interval: 30'@52' Type: Gravel

Casing Interval: 0@32' Length 32'-0" Dia. 2.0' ID Type: PVC SCH.40

Screen Interval: 32'@52' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
5	13	--	--	S1	9"	FINE SILTY SAND AND LIMESTONE GRAVEL, LOOSE, YELLOWISH BROWN/VERY PALE ORANGE (PROBABLE FILL)
10	87	--	--	S2	12"	SILT/CLAY, SOME SAND, HARD, ORANGE BROWN (b)
21	59	CL-ML	9.2	S3	20"	DO
15	86	SC	8.0	S4	17"	DO
13	69	GC-GM	6.0	S5	24"	CLAY AND LIMESTONE GRAVEL, TRACE FINE SAND, VERY HARD, YELLOWISH BROWN/VERY PALE ORANGE, OCC. GRAY MOTTLED (b)
8	90/11	--	--	S6	13"	FINE SANDY SILT, OCC. CLAY LUMPS, VERY DENSE, VERY PALE ORANGE BROWNISH YELLOW/PALE BROWN (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-16 Page: 2 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-07-94

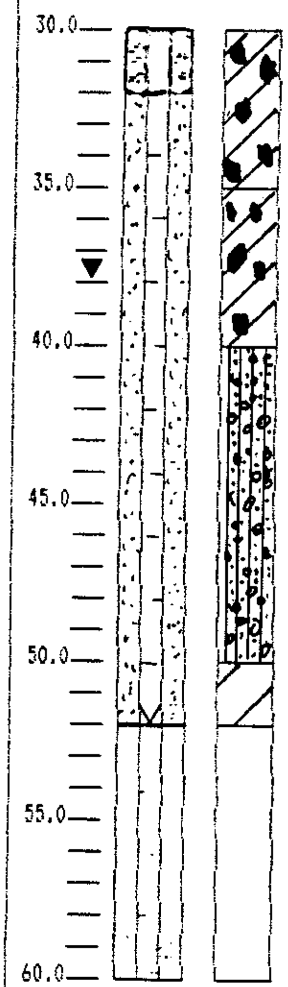
T.O.C. 12.40m G.L. 11.41m Cement: Interval 0@28' Type: Concrete & Earth

Seal Interval: 28'@30' Type: Bentonite (Pellets) Filter pack Interval: 30'@52' Type: Gravel

Casing Interval: 0@32' Length 32'-0" Dia. 2.0" ID Type: PVC SCH.40

Screen Interval: 32'@52' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: O. Garcia Contractor: SOIL-TECH Logged by: Victor E. Rivera & Assocites



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
13	50/6	GC	15.4	S7	8"	DO
17	37	GC	30.1	S8	24"	SILTY CLAY AND LIMESTONE GRAVEL, TRACE FINE SAND, VERY STIFF, YELLOWISH BROWN/VERY PALE ORANGE (b)
22	3	--	8.4	S9	5"	FINE SANDY SILT AND LIMESTONE GRAVEL, MEDIUM DENSE, OLIVE BROWN/GRAY. STRONG ODOR TO GASOLINE (b)
18	77	--	--	S10	16"	DO
39	22	--	--	S11	24"	CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, OCC. SILTY POCKET, VERY HARD, DARK YELLOWISH OLIVE/WHITE MOTTLED (b)

END OF ORING AT 52'-0"

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

D S M Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-17 Page: 1 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-08-94

T.O.C. 10.92m G.L. 9.98m Cement: Interval 0@22' Type: Concrete & Earth

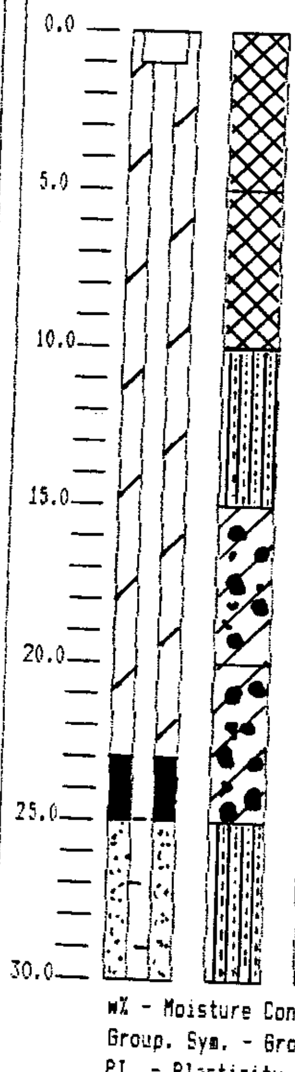
Seal Interval: 22'@24' Type: Bentonite (Pellets) Filter pack Interval: 24'@48' Type: Gravel

Casing Interval: 0@26' Length 26'-0" Dia. 2.0" ID Type: PVC SCH.40

Screen Interval: 26'@46' Length 20.0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
25	18	--	--	S1	13"	CLAY, TRACE FINE SAND, OCC. LIMESTONE PEBBLES, VERY STIFF, YELLOWISH RED/WHITE MOTTLED (PROBABLE FILL)
6	35	--	--	S2	18"	FINE LIMESTONE GRAVEL, OCC. CLAY LUMPS, DENSE, OLIVE BROWN/PALE YELLOW/VERY PALE ORANGE (PROBABLE FILL)
13	27	SC	19.7	S3	18"	DO
14	32	GC	52.3	S4	24"	SILTY CLAY AND LIMESTONE GRAVEL, SOME FINE SAND, HARD, REDDISH BROWN/OLIVE BROWN/VERY PALE ORANGE (b)
9	32	GC-GM	6.4	S5	24"	CLAYEY LIMESTONE GRAVEL, SOME SILT, DENSE, PALE YELLOWISH ORANGE/YELLOW/BROWNISH YELLOW (b)
9	80	SC	8.5	S6	15"	CLAYEY SAND, SOME GRAVEL LIMESTONE, HARD, PALE YELLOWISH ORANGE/YELLOW/BROWNISH YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

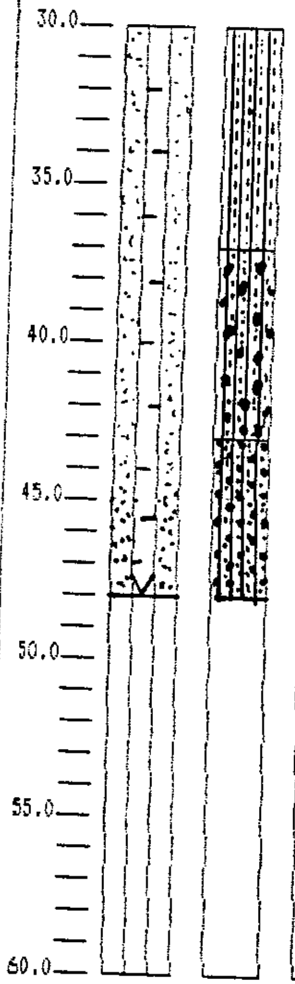
(a) = Information not submitted
(b) = Throughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M   Environmental   Services, Inc.

Company: CORCO SITE FACILITY		Well/Boring Designation : PD-17	Page: 2 of 2
Location : PENUELAS, PUERTO RICO			Date drilled: 06-08-94
T.O.C. 10.92m	G.L. 9.98m	Cement: Interval 0@22'	Type: Concrete & Earth
Seal Interval: 22'@24'	Type: Bentonite (Pellets)	Filter pack Interval: 24'@48'	Type: Gravel
Casing Interval: 0@26'	Length 26'-0"	Dia. 2.0" ID	Type: PVC SCH.40
Screen Interval 26'@46'	Length 20'-0"	Slot: 0.020"	Type: PVC SCH.40 Wire Wrap Sump: 12"
Driller: J.L. Morales	Contractor: SOIL-TECH	Logged by: Victor E. Rivera & Associates	

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
15	6	SC-SM	5.1	S7	8"	FINE SANDY SILT AND LIMESTONE GRAVEL, VERY LOOSE TO LOOSE, BROWNISH YELLOW. (b) CAVITY
16	PUSH	--	--	S8	24"	FINE TO MEDIUM LIMESTONE GRAVEL AND SILTY SAND, VERY LOOSE, GRAY/YELLOW. (b)
18	15	SC	15.7	S9	24"	CLAYEY SILT AND SAND, SOME LIMESTONE GRAVEL, VERY STIFF, PALE BROWN/GRAY. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-18 Page: 1 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-09-94

T.O.C. 10.90m G.L. South 10.75m North 11.02m Cement: Interval 0@21' Type: Concrete & Earth

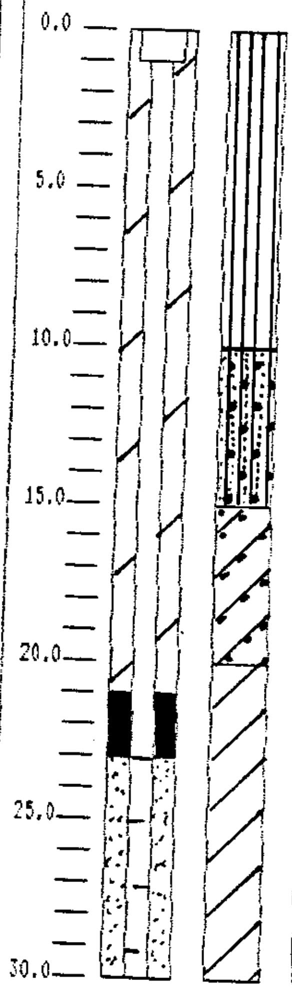
Seal Interval: 21'@23' Type: Bentonite (Pellets) Filter pack Interval: 23'@45' Type: Gravel

Casing Interval: 0@25' Length 25'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 25'@45' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
13	58	--	--	S1	19"	SILT, TRACE FINE SAND AND LIMESTONE GRAVEL, VERY DENSE, YELLOW/ VERY PALE ORANGE. (b)
14	44	--	--	S2	14"	DO
11	50/4	SCSM	4.2	S3	11"	DO
29	60	--	--	S4	13"	CLAYEY SAND, SILT POCKETS, OCC. LIMESTONE PEBBLES, HARD, BROWN/ YELLOW. (b)
8	46	CH	56.5	S5	14"	CLAYEY SILT AND FINE SAND, OCC. LIMESTONE GRAVEL, VERY DENSE, VERY PALE ORANGE/YELLOW. (b)
12	90/5	--	--	S6	17"	DO

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

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DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-18 Page: 2 of 2

Location : PENUELAS, PUERTO RICO Date drilled: 06-09-94

T.O.C. 11.90m G.L. South 10.75m North 11.02m Cement: Interval 0@21' Type: Concrete & Earth

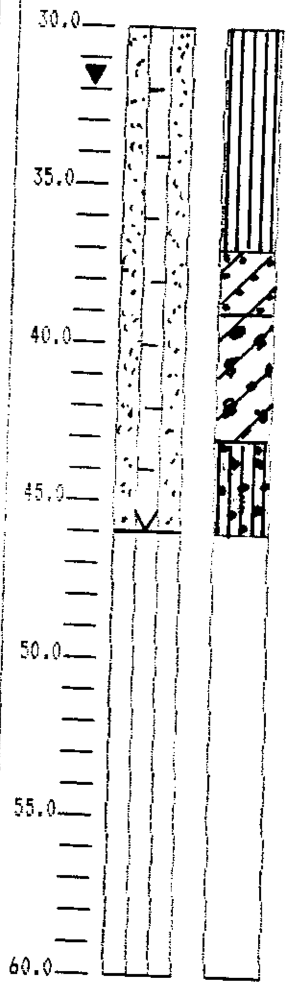
Seal Interval: 21'@23' Type: Bentonite (Pellets) Filter pack Interval: 23'@45' Type: Gravel

Casing Interval: 0@25' Length 25'-0" Dia. 2.0" Type: PVC SCH. 40

Screen Interval: 25'@45' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
18	W/H	GM	--	S7	5"	CLAYEY SILT AND LIMESTONE GRAVEL, TRACE FINE SAND, SOFT TO VERY STIFF, YELLOW/BROWN/PALE YELLOWISH ORANGE.
22	18	GP GC	7.4	S8	13"	DO
15	78	SC	11.7	S9	24"	CLAYEY SILT, TRACE FINE SAND AND LIMESTONE GRAVEL, VERY DENSE, YELLOW/PALE YELLOWISH ORANGE. (b)
12	50/4	GC	23.6	S10	6"	DO
22	45	SCSM	5.8	S11	24"	DO
						END OF BORING AT 46'-0"

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

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(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-19 Page: 1 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-22-94

T.O.C. 28.52m G.L. South 27.62m North 28.05m Cement: Interval 0@76' Type: Concrete & Earth

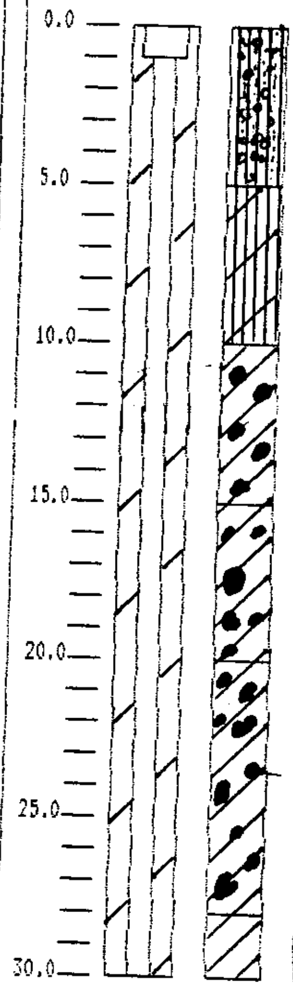
Seal Interval: 76'@78' Type: Bentonite (Pellets) Filter pack Interval: 78'@105' Type: Gravel

Casing Interval: 0@80' Length 80'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 80'@100' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
5	17	--	--	S1	6"	SANDY SILT, LIMESTONE GRAVEL AND PEBBLES, MEDIUM, YELLOW. (b)
18	15	--	--	S2	12"	SILTY CLAY, TRACE FINE SAND, VERY STIFF, YELLOW/PALE YELLOW/WHITE. (b)
11	74	GC	9.2	S3	6"	CLAYEY GRAVEL, TRACE FINE SAND, VERY DENSE, GRAYISH ORANGE/YELLOW (b)
22	33	GC	20.8	S4	15"	SILTY CLAY, LIMESTONE GRAVEL, TRACE FINE SAND, HARD, YELLOWISH BROWN. (b)
10	85	GC	14.0	S5	9"	CLAYEY SILT, SOME FINE LIMESTONE GRAVEL, SOME FINE SAND, VERY HARD YELLOW/WHITE, SLIGHT TO MODERATE ODOR TO HYDROCARBON. (b)
9	66	GC	49.8	S6	16"	DO

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-19 Page: 2 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-23-94

T.O.C. 28.52m G.L. South 27.62m North 28.05m Cement: Interval 0@76' Type: Concrete & Earth

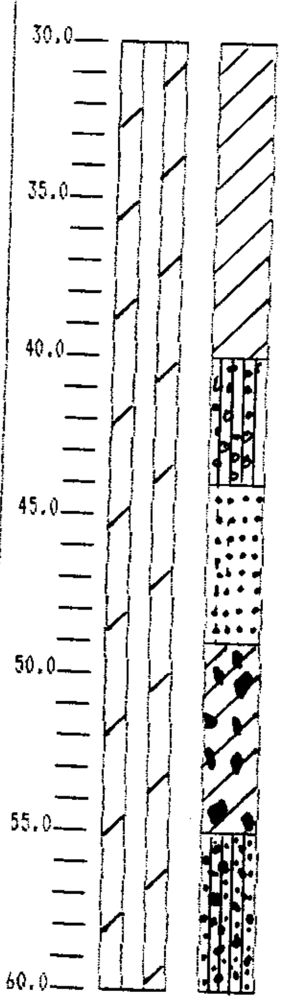
Seal Interval: 76'@78' Type: Bentonite (Pellets) Filter pack Interval: 78'@105' Type: Gravel

Casing Interval: 0@80' Length 85'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 80'@100' Length 80'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
13	50/3	CL	9.0	S7	8"	SILTY CLAY, SOME MEDIUM SAND AND LIMESTONE GRAVEL, VERY HARD, TAN YELLOW (b)
9	135	CL	29.9	S8	13"	DO
30	121	--	--	S9	13"	SANDY SILT, SOME LIMESTONE GRAVEL/VERY FEW CLAYEY POCKETS, VERY DENSE, YELLOW. (b)
23	50/1			S10	2"	COARSE SAND, LIMESTONE GRAVEL, VERY DENSE, YELLOW/TAN. (b)
9	50/3	SC	9.1	S11	4"	SILTY SAND, LIMESTONE GRAVEL, VERY DENSE, YELLOW. (b)
7	50/3	--	--	S12	3"	LIMESTONE GRAVEL, SANDY SILTY, TRACE CLAY, VERY DENSE, PALE YELLOWISH ORANGE/YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO SITE FACILITY Well/Boring Designation : PD-19 Page: 3 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-23-94

T.O.C. 28.55m G.L. South 27.62m North 28.05m Cement: Interval 0@76' Type: Concrete & Earth

Seal Interval: 76'@78' Type: Bentonite (Pellets) Filter pack Interval: 78'@105' Type: Gravel

Casing Interval: 0@80' Length 80'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 80'@100' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY

60.0
65.0
70.0
75.0
80.0
85.0
90.0

w%	N	Group Sym.	PL	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
5	50/3	--	--	S13	6"	LIMESTONE GRAVEL IN A SILTY CLAY MATRIX, TRACE FINE SAND, VERY HARD, PALE YELLOWISH BROWN/YELLOW. (b)
21	50/5	--	--	S14	7"	DO
19	50/5	GC	14.1	S15	19"	LIMESTONE GRAVEL, SILT, CLAY LUMPS, TRACE FINE SAND, VERY DENSE, PALE YELLOWISH BROWN/YELLOW (b)
13	63	--	--	S16	7"	SILTY CLAY, TRACE TO LITTLE FINE TO MEDIUM LIMESTONE GRAVEL, TRACE FINE SAND, VERY HARD, YELLOWISH BROWN/YELLOW. (b)
8	61/11	SC SM	5.6	S17	5"	LIMESTONE GRAVEL IN A SILTY CLAY MATRIX, TRACE FINE SAND, VERY HARD, PALE YELLOWISH BROWN/YELLOW, STRONG ODOR TO HYDROCARBON (b)
28	50/4	GC	8.5	S18	7"	LIMESTONE GRAVEL, TRACE TO LITTLE SAND AND CLAY, VERY DENSE, PALE YELLOWISH ORANGE/YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

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(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

D S M E n v i r o n m e n t a l S e r v i c e s , I n c .

Company: CORCO SITE FACILITY Well/Boring Designation : PD-19 Page: 4 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-23-94

T.O.C. 28.52m G.L. South 27.62m North 28.05m Cement: Interval 0@76' Type: Concrete & Earth

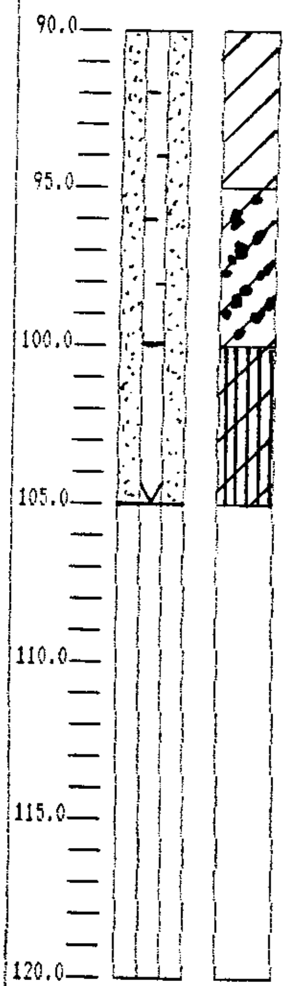
Seal Interval: 76'@78' Type: Bentonite (Pellets) Filter pack: Interval: 80'@105' Type: Gravel

Casing Interval: 0@80' Length 80'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 80'@100' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
24	50/5	CL	14.0	S19	4"	LIMESTONE GRAVEL IN A SILTY CLAY MATRIX, TRACE FINE SAND, VERY HARD, VERY PALE ORANGE/BROWNISH YELLOW (b)
17	50/3	GC	34.9	S20	12"	SANDY/SILTY CLAY, MANY LIMESTONE GRAVEL, VERY HARD, PALE ORANGE BROWN, MODERATE ODOR TO HYDROCARBON (b)
16	50/6	--	--	S21	7"	SILTY CLAY, TRACE FINE SAND, VERY HARD, YELLOWISH BROWN/BLACK SPOT. (b)
						END OF BORING 105.0'

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

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DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY   Well/Boring Designation : PD-20   Page: 1 of 4

Location : PENUELAS, PUERTO RICO   Date drilled: 06-29-94

T.O.C. 24.78m   G.L. 24.72m   Cement: Interval 0@71'   Type: Concrete & Earth

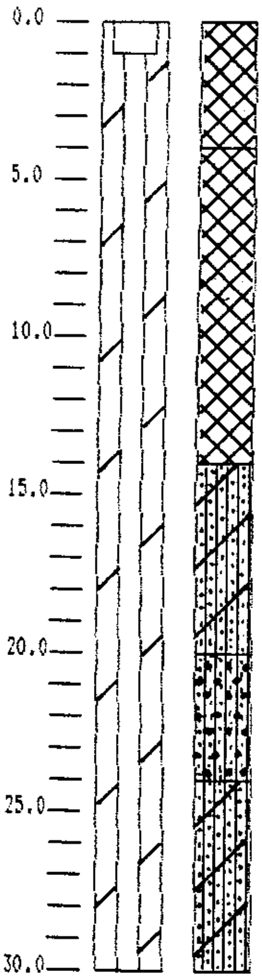
Seal Interval: 71'@73'   Type: Bentonite (Pellets)   Filter pack Interval: 73'@101'   Type: Gravel

Casing Interval: 0@75'   Length 75'-0"   Dia. 2.0" ID   Type: PVC SCH.40

Screen Interval: 75'@95'   Length 20'-0"   Slot 0.20"   Type: PVC SCH.40 Wire Wrap   Sump: 10'

Driller: V. Vazquez   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
9	23	--	--	S1	6"	SILTY CLAY, MANY LIMESTONE GRAVEL, HARD, BROWN (PROBABLE FILL)
19	6	--	--	S2	5"	CLAYEY SILT, SOME SAND AND FINE LIMESTONE GRAVEL, LOOSE, YELLOW/ WHITE (PROBABLE FILL)
26	4	SC	14.9	S3	7"	
22	16	--	--	S4	7"	SANDY/ GRAVELLY CLAY, VERY STIFF TO HARD, DARK BROWN (b)
13	23	SC-SM	9.8	S5	6"	SAND, LIMESTONE GRAVEL, TRACE TO SOME CLAY, MEDIUM, YELLOW/BROWN (b)
14	62	--	--	S6	14"	SILTY/SANDY CLAY, MANY LIMESTONE GRAVEL, VERY HARD, YELLOW BROWN. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

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(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-20 Page: 2 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-29-94

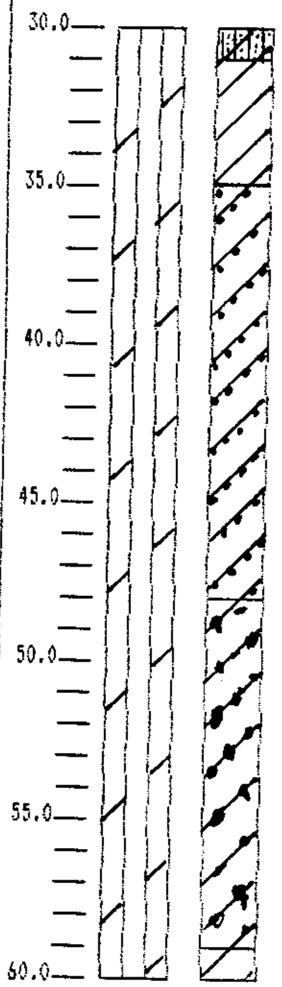
T.O.C. 24.78m G.L. 24.72m Cement: Interval 0@71' Type: Concrete & Earth

Seal Interval: 71'@75' Type: Bentonite (Pellets) Filter pack Interval: 73'@101' Type: Gravel

Casing Interval: 0@75' Length 75'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 75'@95' Length 20'-0" Slot 0.020" Type: PVC SCH.40 Wire Wrap Sump: 10'

Driller: V. Vazquez Contractor: SOILTECH Logged by: Victor E. Rivera & Associates



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
14	19	CL	11.7	S7	18"	SILTY CLAYEY SAND, TRACE LIMESTONE GRAVEL, VERY DENSE, YELLOW (b)
11	90/6	SC	4.8	S8	4"	DO
--	50/1	--	--	S9	0"	NO RECOVERY
--	50/3	--	--	S10	0"	NO RECOVERY
10	51	GC GM	5.2	S11	18"	LIMESTONE GRAVEL, TRACE SILT, TRACE SAND, VERY DENSE, YELLOW WHITE (b)
12	50/5	--	--	S12	10"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

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DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-20 Page: 3 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-29-94

T.O.C. 24.78m G.L. 24.72m Cement: Interval 0@71' Type: Concrete & Earth

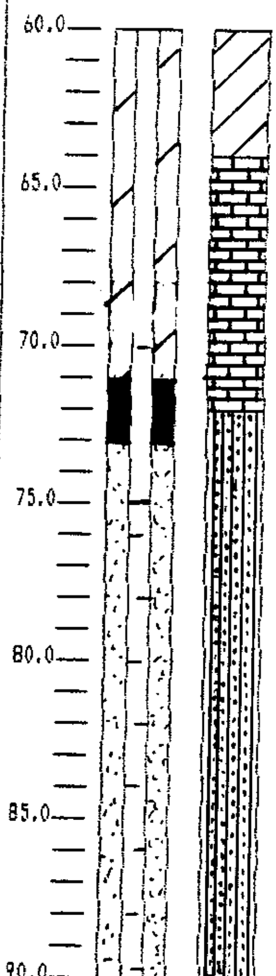
Seal Interval: 71'@73' Type: Bentonite (Pellets) Filter pack Interval: 73'@101' Type: Gravel

Casing Interval: 0@75' Length 75'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 75'@95' Length 20'-0" Slot 0.02" Type: PVC SCH.40 Wire Wrap Sump: 10'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
60.0	34	44	CL	8.4	S13	20"	GRAVELLY CLAY, SOME SAND, HARD, REDDISH BROWN/YELLOW (b)
65.0	19	71	--	--	S14	18"	LIMESTONE GRAVEL, TRACE SILTY SAND, VERY DENSE, YELLOW. (b)
70.0	14	50/4	--	--	S15	3"	DO
75.0	--	50/6	--	--	S16	0"	NO RECOVERY
80.0	--	91	SM	3.1	S17	15"	SILT/SOME FINE SAND, SOME CLAY AND LIMESTONE GRAVEL, VERY DENSE, YELLOW, STRONG ODOR TO GASOLINE (b)
85.0	--	50/2	--	--	S18	0"	NO RECOVERY
90.0							

w% - Moisture Content
Group. Sym. - Group Symbol(USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-20 Page: 4 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-29-94

T.O.C. 24.78m G.L. 24.72m Cement: Interval 0@71' Type: Concrete & Earth

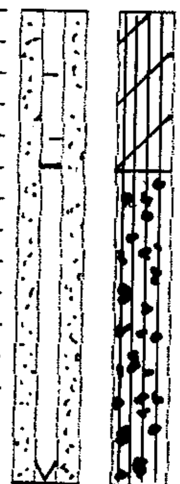
Seal Interval: 71'@73' Type: Bentonite (Pellets) Filter pack Interval: 73'@101' Type: GRAVEL

Casing Interval: 0@75' Length 75'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 75'@95' Length 20'-0" Slot 0.02" Type: PVC SCH.40 Wire Wrap Sump: 10'

Driller: V. Vaquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
90.0							
	21	50/6	CL ML	4.1	S19	9"	SILT, SOME CLAY, SOME FINE SAND, SOME FINE LIMESTONE GRAVEL, VERY DENSE, YELLOW (b)
95.0	25	50/4	GC	12.2	S20	2"	DO
100.0					*		
					*		
105.0							END OF BORING 105'-0"
110.0							
115.0							
120.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably
(*) = No sampling attempted

DSM Project # 1012-02

D S M E n v i r o n m e n t a l S e r v i c e s , I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-21 Page: 1 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 07-09-94

T.O.C. 29.96m G.L. 28.93m Cement: Interval 0@104' Type: Cement & Earth

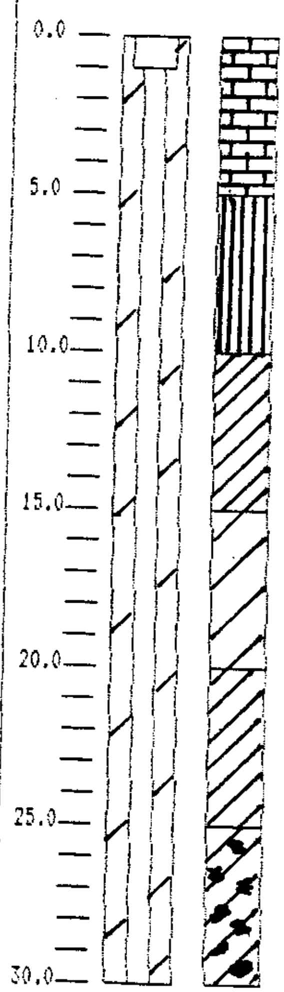
Seal Interval: 104'@108' Type: Bentonite (Pellets) Filter pack Interval: 108'@132' Type: Gravel

Casing Interval: 0@110' Length 110'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 110'@130' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
17	15	--	--	S1	8"	FINE TO COARSE LIMESTONE GRAVEL, SOME CLAY, TRACE FINE SAND, MEDIUM, VERY PALE ORANGE/DARK BROWN. (b)
22	34	--	--	S2	24"	CLAYEY SILT, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, HARD, LIGHT GRAY/PALE YELLOW. MODERATE ODOR TO HYDROCARBON. (b)
22	60/11	CL	12.9	S3	16"	LIMESTONE GRAVEL, CLAYEY SILT, TRACE FINE SAND, VERY DENSE, YELLOW PALE/YELLOW (b)
44	10	CH	58.9	S4	24"	SILTY CLAY, TRACE FINE SAND, STIFF, OLIVE YELLOW/YELLOW. (b)
13	50/6	CL	11.0	S5	6"	LIMESTONE GRAVEL IN A CLAYEY SILT MATRIX, TRACE FINE SAND, VERY, HARD, YELLOW/PALE YELLOW. (b)
25	40	GC	63.5	S6	24"	SILTY CLAY, LIMESTONE GRAVEL, TRACE FINE SAND, HARD, REDDISH BROWN. (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY   Well/Boring Designation : PD-21   Page: 2 of 5

Location : PENUELAS, PUERTO RICO   Date drilled: 07-09-94

T.O.C. 29.96m   G.L. 28.93m   Cement: Interval 0@104'   Type: Cement & Earth

Seal Interval: 104'@108'   Type: Bentonite (Pellets)   Filter pack Interval: 108'@132'   Type: Gravel

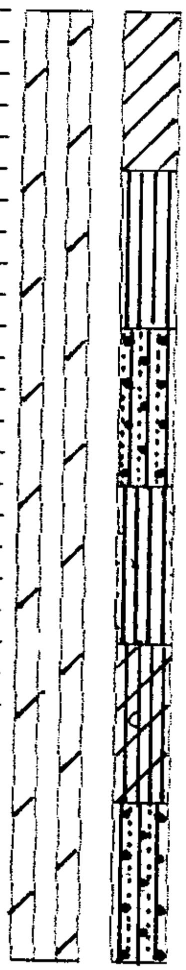
Casing Interval: 0@110'   Length 110'-0"   Dia. 2.0" ID   Type: PVC SCH. 40

Screen Interval: 110@130'   Length 20'-0"   Slot: 0.020"   Type: PVC SCH. 40 Wire Wrap   Sump: 12"

Driller: J.L. Morales   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY

30.0
35.0
40.0
45.0
50.0
55.0
60.0



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
11	82/10	GC	5.3	S7	24"	SILTY SAND AND LIMESTONE GRAVEL, CLAY LUMPS, TRACE FINE SAND, VERY DENSE, YELLOW/YELLOWISH BROWN. (a)
14	55	--	--	S8		CLAYEY SILT, TRACE FINE SAND, OCC. LIMESTONE PEBBLES, VERY DENSE, YELLOW/YELLOWISH BROWN. (b)
8	6	GP	4.7	S9	8"	FINE TO MEDIUM SILTY SAND AND LIMESTONE GRAVEL, LOOSE, YELLOW S9= GP (GC-GM) (b)
10	30	--	--	S10	10"	CLAYEY SILT AND LIMESTONE GRAVEL, TRACE FINE TO MEDIUM SAND, DENSE, YELLOW YELLOWISH BROWN. (b)
23	24	CL	17.0	S11	24"	SILTY CLAY, TRACE FINE TO MEDIUM SAND, TRACE TO SOME LIMESTONE GRAVEL, HARD, PALE YELLOWISH ORANGE/YELLOW/ YELLOWISH BROWN (b)
8	21	--	--	S12	22"	FINE TO MEDIUM SAND, SOME SILT AND LIMESTONE GRAVEL, MEDIUM, YELLOW (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-21 Page: 3 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 07-09-94

T.O.C. 29.96m G.L. 28.93m Cement: Interval 0@104' Type: Cement & Earth

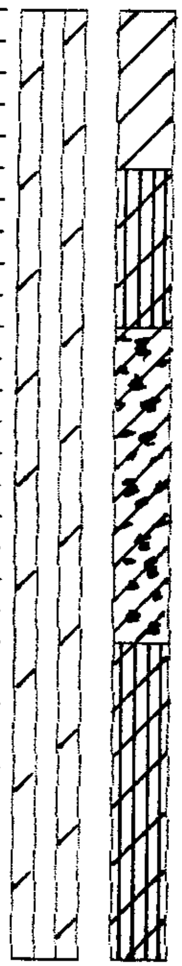
Seal Interval: 104'@108' Type: Bentonite (Pellets) Filter pack Interval: 108'@132' Type: Gravel

Casing Interval: 0@110' Length 110'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 110'@130' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12"

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
60.0	38	21	CH	59.1	S13	24"	SILTY CLAY, TRACE SAND, HARD, ORANGE BROWN (b)
65.0	13	78	--	--	S14	24"	SILTY CLAY, TRACE TO LITTLE FINE SAND, OCC. LIMESTONE GRAVEL, VERY HARD, YELLOWISH BROWN/YELLOW. (b)
70.0	--	68/10	GC	21.7	S15	10"	CLAYEY LIMESTONE GRAVEL, TRACE SILT, SOME SAND, DENSE TO VERY DENSE, BROWNISH YELLOW/PALE YELLOW.
75.0	28	39	--	--	S16	12"	DO (b)
80.0	47	48			S17	12"	SILTY CLAY, LITTLE TO SOME LIMESTONE GRAVEL,TRACE FINE SAND, HARD, YELLOWISH BROWN/PALE YELLOW. (b)
85.0	12	50/3	--	--	S18	12"	DO
90.0							

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-21 Page: 4 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 07-09-94

T.O.C. 29.96m G.L. 28.93m Cement: Interval 0@104' Type: Cement & Earth

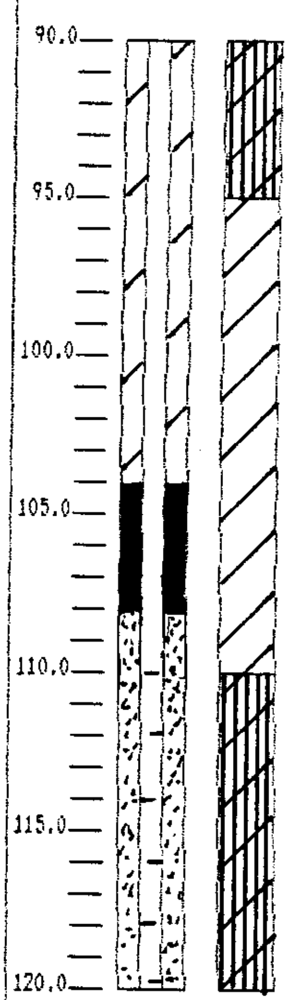
Seal Interval: 104'@108' Type: Bentonite (Pellets) Filter pack Interval: 108'@132' Type: Gravel

Casing Interval: 0@110' Length 110'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 110'@130' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Sump: 12" Wire Wrap

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
21	70/9	--	--	S19	12"	DO
30	42	--	--	S20	24"	SILTY CLAY, TRACE FINE SAND, VERY HARD, BROWN. (b)
31	39	CH	48	S21	24"	DO
		CH	48.0			
33	30			S22	24"	DO
51	63/11	--	--	S23	24"	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, VERY HARD, DARK YELLOWISH BROWN/PALE YELLOW. (b)
				*		

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably
(*) = Sampling not attempted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-21 | Page: 5 of 5

Location : PENUELAS, PUERTO RICO | Date drilled: 07-09-94

T.O.C. 29.96m | G.L. 28.93m | Cement: Interval 0@104' Type: Cement & Earth

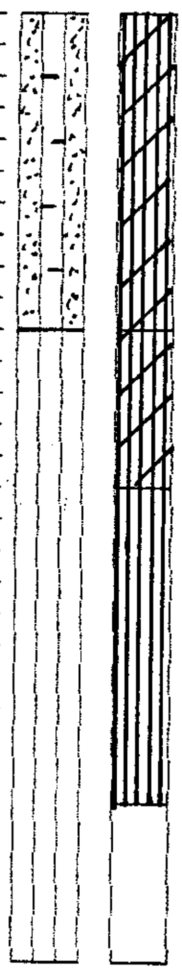
Seal Interval: 104'@108' | Type: Bentonite (Pellets) | Filter pack Interval: 108@132' | Type: Gravel

Casing Interval: 0@110' | Length 110'-0" | Dia. 2.0" ID | Type: PVC SCH. 40

Screen Interval: 110'@130' | Length 20'-0" | Slot: 0.020" | Type: PVC SCH. 40 Wire Wrap | Sump: 12"

Driller: J.L. Morales | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
120.0					*		
125.0					*		
130.0	14	50/2	--	--	S24	6"	SILTY CLAY, TRACE TO LITTLE FINE TO MEDIUM LIMESTONE GRAVEL, TRACE FINE SAND, VERY HARD, YELLOW/PALE BROWN.
135.0	20	50/5	--	--	S25	8"	CLAYEY SILT, TRACE TO LITTLE FINE TO MEDIUM SAND, OCC. LIMESTONE PEBBLES, VERY HARD, YELLOW/WHITE.
140.0					*		
					*		
145.0							END OF BORING AT 145'- 0"
150.0							

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably
(*) = Sampling not attempted

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY　　Well/Boring Designation : PD-22　　Page: 1 of 7

Location : PENUELAS, PUERTO RICO　　Date drilled: 07-09-94

T.O.C. 51.28m　　G.L. 50.05m　　Cement Interval: 0'@145'　　Type: Concrete & Earth

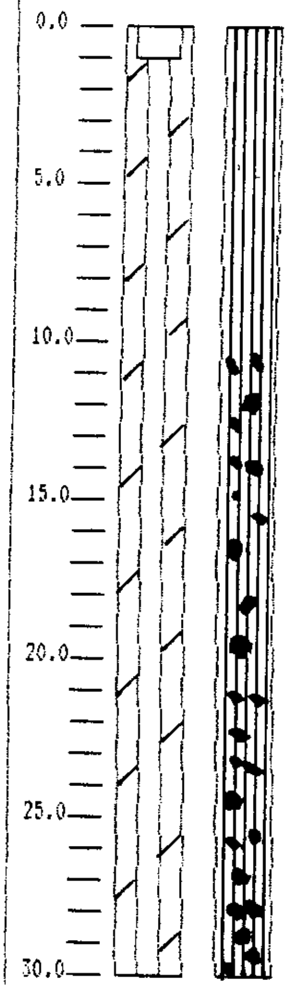
Seal Interval: 145'@148'　　Type: Bentonite (Pellets)　　Filter pack Interval: 148'@173'　　Type: Gravel

Casing Interval: 0'@150'　　Length 150'-0"　　Dia. 2.0" ID　　Type: PVC SCH.40

Screen Interval: 150'@180'　　Length 30'-0"　　Slot: 0.020"　　Type: PVC SCH.40 Wire Wrap　　Sump: 10'

Driller: V. Vazquez　　Contractor: SOIL-TECH　　Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
4.0	28	--	--	S1	6"	SILT, SOME SAND, TRACE TO SOME LIMESTONE GRAVEL, OCC. MORE SANDY, DENSE TO VERY DENSE, YELLOW/WHITE (b)
8	71	--	--	S2	6"	DO
4.0	50/3	GC	9.6	S3	7"	DO
10	52	--	--	S4	12"	DO
12	50/4	--	--	S5	6"	DO
9	50/3	--	--	S6	3"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone gravel most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY   Well/Boring Designation : PD-22   Page: 3 of 7

Location : PENUELAS, PUERTO RICO   Date drilled: 07-09-94

T.O.C. 51.28m   G.L. 50.05m   Cement Interval: 0@145' Type: Concrete & Earth

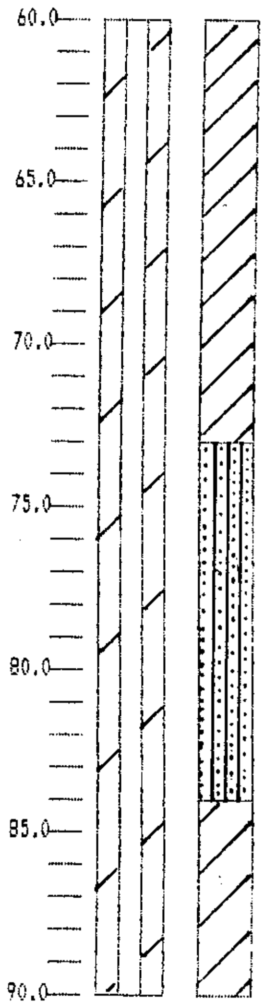
Seal Interval: 145@148'   Type: Bentonite (Pellets)   Filter pack Interval: 148'@173'   Type: Gravel

Casing Interval: 0@150'   Length 150'-0"   Dia. 2.0" ID   Type: PVC SCH. 40

Screen Interval: 150'@180'   Length 30.0'   Slot: 0.020"   Type: PVC SCH.40 Sump: 10'
Wire Wrap

Driller: V. Vazquez   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Assocites

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
7	50/3			S13	2"	SILT, SOME SAND, TRACE TO SOME LIMESTONE GRAVEL, OCCASIONALLY MORE SANDY, VERY DENSE, YELLOW/WHITE
13	51					
		--	--	S14	17"	DO
9	50/3	CL	9.9	S15	2"	DO
8	50/5	--	--	S16	3"	SILTY SAND, SOME LIMESTONE GRAVEL, FEW CLAY POCKETS, VERY DENSE, YELLOW/WHITE
--	50/1	--	--	S17	0"	NO RECOVERY
14	50/5	CH	28.1	S18	3"	CLAY, SOME SILT, TRACE SAND AND LIMESTONE GRAVEL, VERY HARD, ORANGE/BROWN

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone gravel most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-22 Page: 4 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 07-09-94

T.O.C. 51.28m G.L. 50.05m Cement Interval: 0@145' Type: Concrete & Earth

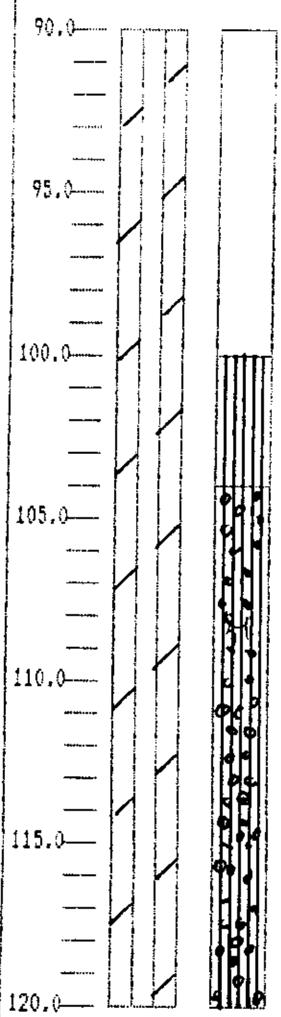
Seal Interval: 145@148' Type: Bentonite (Pellets) Filter pack Interval: 148@173' Type: Gravel

Casing Interval: 0@150' Length 150'-0" Dia. 2.0" ID Type: PVC SHC. 40

Screen Interval: 150@180' Length 30'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 10'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Assocites

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
--	50/1	--	--	S19	0"	NO RECOVERY
--	50/1	--	--	S20	0"	NO RECOVERY
8	50/3	--	--	S21	2"	SILT,SOME SAND,TRACE LIMESTONE GRAVEL, VERY DENSE, TAN/WHITE
7	50/3	--	--	S22	2"	SANDY SILT,TRACE TO SOME LIMESTONE GRAVEL, VERY DENSE, TAN/WHITE
--	50/2	--	--	S23	0"	NO RECOVERY
--	50/1	--	--	S24	0"	NO RECOVERY

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone gravel most probably

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-22 | Page: 5 of 7

Location : PENUELAS, PUERTO RICO | Date drilled: 07-09-94

T.O.C. 51.28m | G.L. 50.05m | Cement Interval: 0@145' | Type: Concrete & Earth

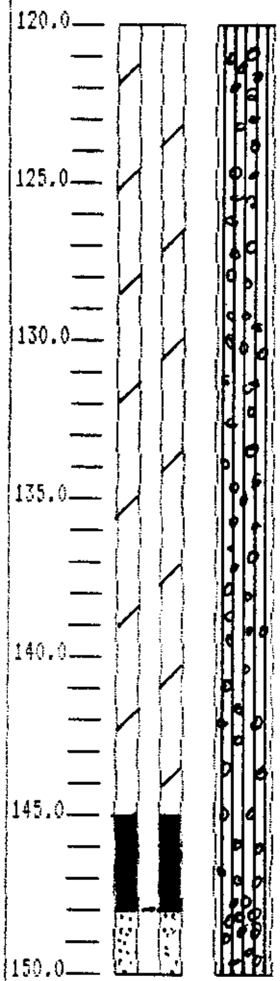
Seal: Interval 145@148' | Type: Bentonite (Pellets) | Filter pack Interval: 148'@173' | Type: Gravel

Casing: Interval 0@150' | Length 150.0' | Dia. 2.0" ID | Type: PVC SCH.40

Screen: Interval 150'@180' | Length 30'-0" | Slot: 0.020" | Type: PVC SCH. 40 Wire Wrap | Sump: 10'

Driller: V. Vazquez | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
--	50/1	--	--	S25	0"	NO RECOVERY
13	50/3	--	--	S26	2"	SILT, SOME FINE SAND, TRACE LIMESTONE GRAVEL, VERY FEW CLAY POCKETS, VERY DENSE, TAN/YELLOW.
--	50/2	--	--	S27	0"	NO RECOVERY
11	50/2	--	--	S28	1"	DO
--	50/1	--	--	S29	0"	NO RECOVERY
--	--	--	--	S30	0"	NO RECOVERY

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone gravel most probably

DSM Project #1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-22 |

Location : PENUELAS, PUERTO RICO | Date drilled: 07-09-94

T.O.C. 51.28m | G.L. 50.05m | Cement Interval: 0@145' Type: Concrete & Earth

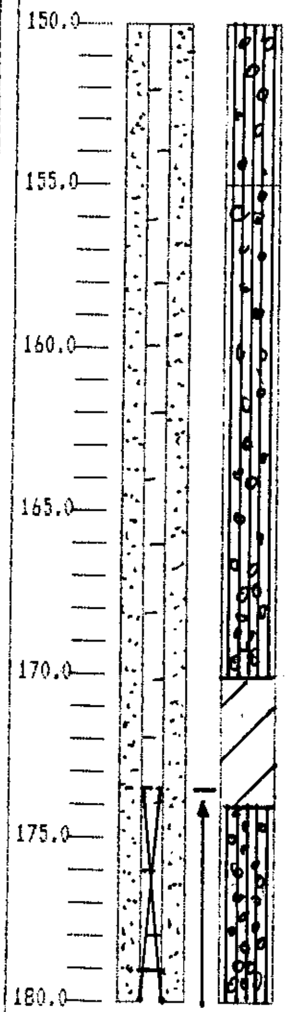
Seal Interval: 145@148' | Type: Bentonite (Pellets) | Filter pack Interval: 148@173' | Type: Gravel

Casing Interval: 0@150' | Length 150-0" | Dia. 2.0" ID | Type: PVC SCH.40

Screen Interval: 150'@180' | Length 30'-0" | Slot: 0.020" | Type: PVC SCH.40 Wire Wrap | Sump: 10'

Driller: V. Vazquez | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
5	50/2	--	--	S31	1"	SILT, SAND, FEW CLAY POCKETS, TRACE LIMESTONE GRAVEL VERY DENSE, YELLOW/TAN/ORANGE, STRONG ODOR TO HYDROCARBON.
--	50/2	--	--	S32	1/4"	SILT, SAND, LIMESTONE GRAVEL, VERY DENSE, YELLOW.
--	50/0	--	--	S33	0"	NO RECOVERY
--	50/1	--	--	S34	0"	NO RECOVERY
21	50/5	CH	41.6	S35	4"	CLAY, TRACE TO SOME SILT, VERY HARD, BROWN. STRONG ODOR TO HYDROCARBON
9	50/2	--	--	S36	1"	SANDY SILT, FEW FINE LIMESTONE GRAVEL VERY DENSE, YELLOW/TAN, STRONG ODOR TO HYDROCARBON

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone gravel most probably

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-22 | Page: 7 of 7

Location : PENUELAS, PUERTO RICO | Date drilled: 07-09-94

T.O.C. 51.28m | G.L. 50.05m | Cement Interval: 0@145' | Type: Concrete & Earth

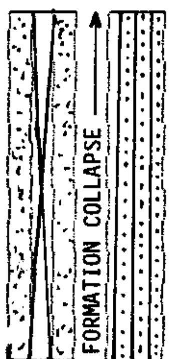
Seal: Interval 145'@148' | Type: Bentonite (Pellets) | Filter pack Interval: 148'@173' | Type: Gravel

Casing Interval: 0@150' | Length 150'-0" | Dia. 2.0" ID | Type: PVC SCH. 40

Screen Interval: 150'@180' | Length 30'-0" | Slot: 0.020" | Type: PVC SCH.40 Wire Wrap | Sump: 10'

Driller: V. Vazquez | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Asociates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
180.0	--	50/1	--	--	S37	0"	SILTY MEDIUM SAND, SOME CLAY AND LIMESTONE GRAVEL, VERY DENSE, WHITE
185.0	11	50/2			S38	1"	DO
			SC-SM	6.4			
190.0	17	50/3			S39	2"	DO
							END OF BORING AT 190.25'
195.0							
200.0							
205.0							
210.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone gravel most probably

DSM Project #1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY | Well/Boring Designation : PD-23 | Page: 1 of 4

Location : PENUELAS, PUERTO RICO | Date drilled: 06-20-94

T.O.C. 28.46m | G.L. 27.51m | Cement: Interval 0@76′ Type: Cement & Earth

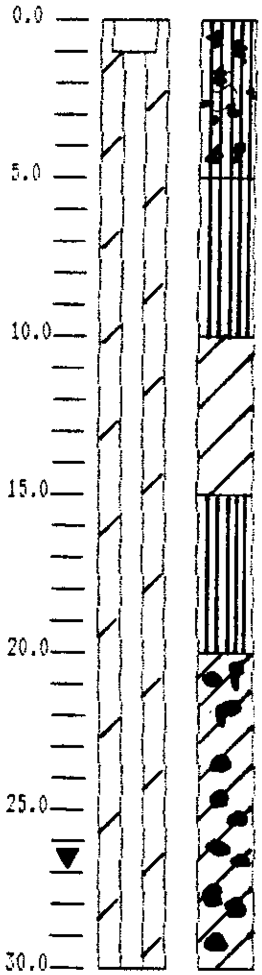
Seal Interval: 76′@78′ | Type: Bentonite (Pellets) | Filter pack Interval: 78′@101′ | Type: Gravel

Casing Interval: 0@80′ | Length 80′-0" | Dia. 2.0" ID | Type: PVC SCH. 40

Screen Interval: 80′@100′ | Length 20′-0" | Slot: 0.020" | Type: PVC SCH. 40 Wire Wrap Sump: 5"

Driller: J.L. Morales | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
13.3	57	--	--	S1	12"	FINE TO MEDIUM LIMESTONE GRAVEL AND SILT, TRACE FINE SAND, VERY DENSE, YELLOW (b)
17.3	19	--	--	S2	17"	SILT, TRACE CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, MEDIUM, YELLOW. (b)
14.2	70	CL	11.1	S3	20"	CLAYEY SILT, FINE TO MEDIUM LIMESTONE GRAVEL, TRACE FINE SAND, DENSE, YELLOW/BROWNISH YELLOW (b)
12.9	35	--	--	S4	15"	FINE TO MEDIUM LIMESTONE GRAVEL, CLAY AND SILT LUMPS,DENSE, YELLO WHITE/OLIVE GRAY. (b)
15.8	76/12	GC	32.6	S5	18"	SILTY CLAY AND LIMESTONE GRAVEL, TRACE FINE SAND, VERY HARD, VERY PALE ORANGE/YELLOWISH BROWN/WHITE (b)
23	96/10	--	--	S6	18"	DO

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-23 Page: 2 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-20-94

T.O.C. 28.46m G.L. 27.51m Cement: Interval 0@76' Type: Cement & Earth

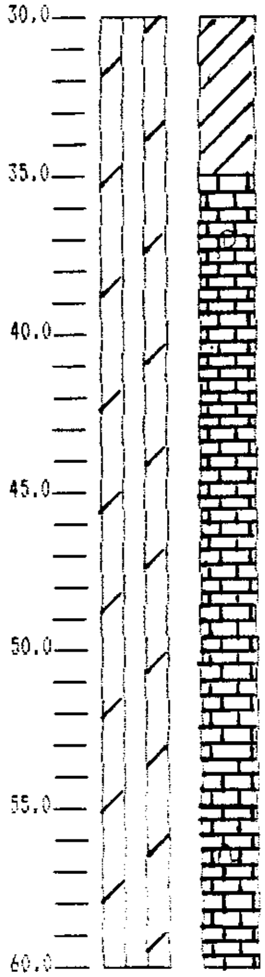
Seal Interval: 76'@78' Type: Bentonite (Pellets) Filter pack Interval: 78'@101' Type: Gravel

Casing Interval: 0@80' Length 40'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 80'@100' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5'

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PL	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
30.0–35.0	23.6	78	CL	17	S7	24"	SILT, CLAY LUMPS, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, VERY HARD, YELLOW/WHITE/YELLOWISH BROWN (b)
35.0–55.0	8.4	87/10			S8	12"	LIMESTONE GRAVEL.SILT AND CLAY, TRACE FINE SAND, VERY DENSE, PALE ORANGE/YELLOW/YELLOWISH BROWN. (b)
	13.8	50/3			S9	6"	DO
	19.0	68			S10	24"	DO
	10.8	77/10			S11	20"	DO
55.0–60.0	6.4	50/6			S12	4"	LIMESTONE GRAVEL, SILT, CLAY LUMPS, TRACE FINE SAND, VERY DENSE, VERY PALE ORANGE/WHITE/BROWNISH YELLOW (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-23 | Page: 3 of 4

Location : PENUELAS, PUERTO RICO | Date drilled: 06-20-94

T.O.C. 28.46m | G.L. 27.51m | Cement: Interval 0@76' Type: Cement & Earth

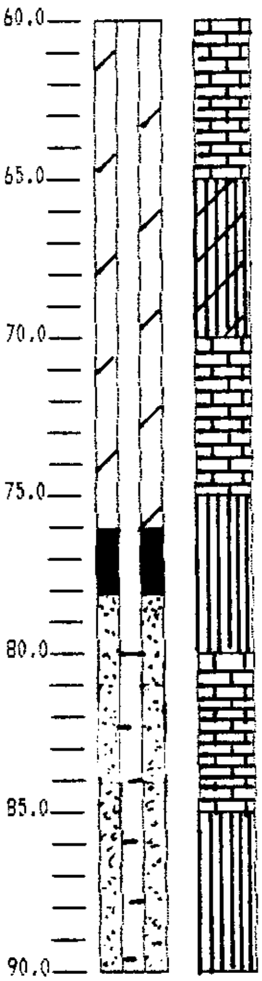
Seal Interval: 76'@78' | Type: Bentonite (Pellets) | Filter pack Interval: 78'@101' | Type: Gravel

Casing Interval: 0@80' | Length 80'-0" | Dia. 2.0" ID | Type: PVC SCH. 40

Screen Interval: 80'@100' | Length 20'-0" | Slot: 0.020" | Type: PVC SCH. 40 Wire Wrap Sump: 5'

Driller: J.L. Morales | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
11.8	88/8			S13	5"	LIMESTONE GRAVEL, SILT AND CLAY, TRACE FINE SAND, VERY DENSE, PALE ORANGE/YELLOW (b)
25.3	32			S14	24"	SILTY CLAY, SAND, OCC. LIMESTONE PEBBLES, HARD, YELLOWISH BROWN. (b)
5.1	50/1			S15	2"	LIMESTONE GRAVEL, SILT, TRACE FINE SAND, VERY DENSE, VERY PALE ORANGE/YELLOW. (b)
19.6	26			S16	15"	SILT, CLAY LUMPS, TRACE FINE TO MEDIUM LIMESTONE GRAVEL, TRACE FINE SAND, MEDIUM DENSE, YELLOWISH BROWN. (b)
20.2	17			S17	13"	LIMESTONE GRAVEL, SILT, CLAY LUMPS, TRACE FINE SAND, MEDIUM, PALE YELLOWISH ORANGE/YELLOW, STRONG ODOR TO HYDROCARBON. (b)
18.9	37			S18	24"	SILT, CLAY LUMPS, TRACE FINE SAND, OCC. LIMESTONE PEBBLES, DENSE, YELLOW/PALE YELLOW/ BROWNISH YELLOW, STRONG ODOR TO HYDROCARBON. (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY   Well/Boring Designation : PD-23   Page: 4 of 4

Location : PENUELAS, PUERTO RICO   Date drilled: 06-20-94

T.O.C. 28.46m   G.L. 27.51m   Cement: Interval 0@76'   Type: Cement & Earth

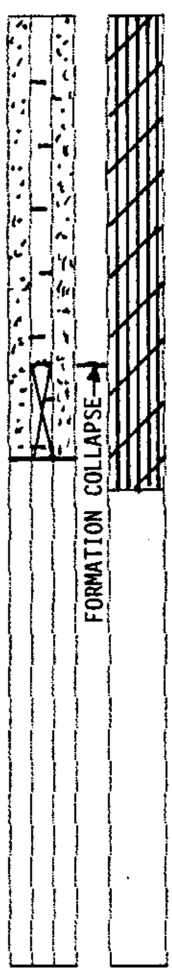
Seal Interval: 76'@78'   Type: Bentonite (Pellets)   Filter pack Interval: 78'@101'   Type: Gravel

Casing Interval: 0@80'   Length 80'-0"   Dia. 2.0" ID   Type: PVC SCH. 40

Screen Interval: 80'@100'   Length 20'-0"   Slot: 0.020"   Type: PVC SCH. 40 Wire Wrap   Sump: 5"

Driller: J.L. Morales   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PL	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
90.0	19.1	64			S19		CLAYEY SILT, TRACE FINE TO MEDIUM LIMESTONE GRAVEL, TRACE FINE SAND, VERY DENSE, PALE YELLOW/YELLOW, STRONG ODOR TO HYDROCARBON (b)
95.0	16.5	85			S20		DO
100.0	14.1	50/3			S21 (*)		DO
105.0							END OF BORING 105.0'
110.0							
115.0							
120.0							

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably
(*) = Sampling not attempted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY　　Well/Boring Designation : PD-24　　

Location : PENUELAS, PUERTO RICO　　Date drilled: 06-24-94

T.O.C. 31.48m　　G.L. 30.61m　　Cement: Interval 0@118' Type: Cement & Earth

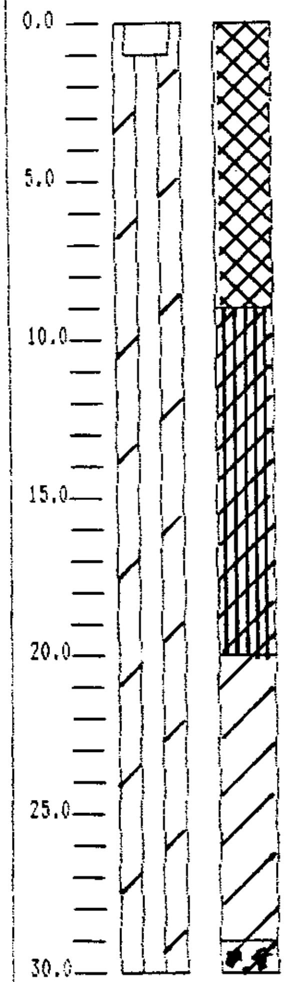
Seal Interval: 118'@120'　　Type: Bentonite (Pellets)　　Filter pack Interval: 120'@143'　　Type: Gravel

Casing Interval: 0@122'　　Length 122'-0"　　Dia. 2.0" ID　　Type: PVC SCH. 40

Screen Interval: 122'@142'　　Length 20'-0"　　Slot: 0.020"　　Type: PVC SCH. 40 Wire Wrap　　Sump: 12'

Driller: V. Vazquez　　Contractor: SOIL-TECH　　Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
9.5	14	--	--	S1	7"	SANDY SILT/LIMESTONE GRAVEL, LOOSE, GRAYISH BROWN (PROBABLE FILL)
--	50/0	--	--	S2	0"	NO RECOVERY
18	21	CL	3.9	S3	12"	CHALKY SILT/TRACE TO SOME MEDIUM SAND AND FINE LIMESTONE GRAVEL, MEDIUM DENSE TO DENSE, TAN/WHITE (b)
15	42	--	--	S4	15"	DO
28	17	CH	52.7	S5	24"	CLAY, HARD, ORANGE/BROWN (b)
33	59/7	--	--	S6	20"	DO

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY
Well/Boring Designation : PD-24

Location : PENUELAS, PUERTO RICO
Date drilled: 06-24-94

T.O.C. 31.48m
G.L. 30.61m
Cement: Interval 0@118' Type: Cement & Earth

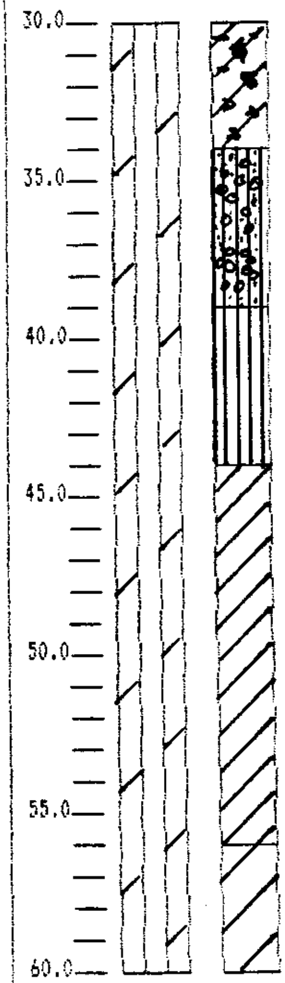
Seal Interval: 118'@120'
Type: Bentonite (Pellets)
Filter pack Interval: 128'@143' Type: Gravel

Casing Interval: 0@122'
Length 122'-0"
Dia. 2.0" ID
Type: PVC SCH. 40

Screen Interval: 122'@142'
Length 20'-0"
Slot: 0.020"
Type: PVC SCH. 40 Wire Wrap
Sump: 12"

Driller: V. Vaquez
Contractor: SOIL-TECH
Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PL	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
5	50/5	GC	19.8	S7	5"	GRAVELLY CLAY, SOME SAND, VERY HARD, BROWN/TAN (b)
4	50/5	--	--	S8	8"	SANDY CHALKY SILT, TRACE LIMESTONE GRAVEL, VERY DENSE, YELLOW (b)
10	50/4	ML	13.9	S9	10"	CLAYEY SAND, LIMESTONE GRAVEL, VERY DENSE, YELLOW/ORANGE (b)
21	98	--	--	S10	17"	CLAY, SOME LIMESTONE GRAVEL, VERY HARD, ORANGE/BROWN. (b)
10	50/6	CL	31.5	S11	5"	DO
22	86	--	--	S12	13"	GRAVELLY CLAY, SOME MEDIUM SAND, HARD, ORANGE BROWN. (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-24 Page: 3 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 06-24-94

T.O.C. 31.48m G.L. 30.61m Cement: Interval 0@118' Type: Cement & Earth

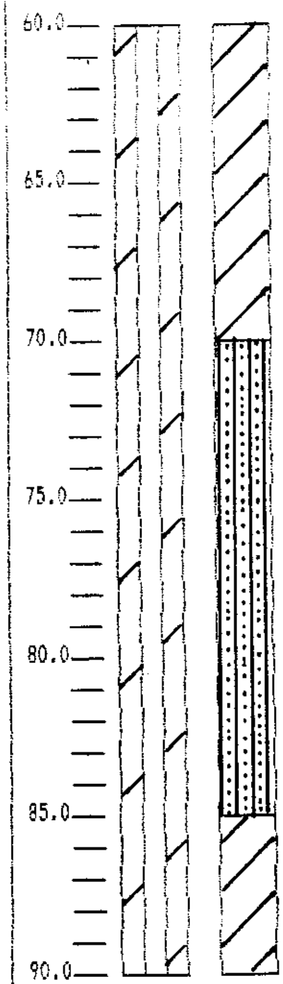
Seal Interval: 118'@120' Type: Bentonite (Pellets) Filter pack Interval: 120'@143' Type: Gravel

Casing Interval: 0@122' Length 122'-0" Dia. 2.0" ID Type: PVC SCH. 40

Screen Interval: 122'@142' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Sump: 12" Wire Wrap

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
6	50/2	SC	11.0	S13	1"	DO
11	50/4	--	--	S14	3"	DO
8	50/4			S15	3"	SILTY SAND, MANY LIMESTONE GRAVEL, OCC. CLAYEY POCKETS, VERY DENSE YELLOW/BROWN (b)
10	50/4			S16	3"	DO
11	50/3	--	--	S17	2"	DO
13	59	--	--	S18	20"	CLAY, TRACE LIMESTONE GRAVEL, VERY STIFF TO HARD, ORANGE BROWN, SLIGHTLY ODOR TO HYDROCARBON (b)

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a)= Information not submitted
(b)= Thoroughtly weathered tertiary limestone, most probably

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-24 | Page: 4 of 5

Location : PENUELAS, PUERTO RICO | Date drilled: 06-24-94

T.O.C. 31.48m | G.L. 30.61m | Cement: Interval 0@118' | Type: Cement & Earth

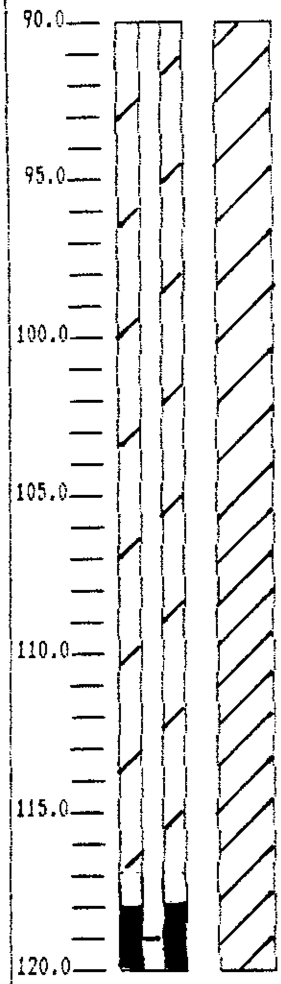
Seal Interval: 118'@120' | Type: Bentonite (Pellets) | Filter pack Interval: 120'@143' | Type: Gravel

Casing Interval: 0@122' | Length 122'-0" | Dia. 2.0" ID | Type: PVC SCH. 40

Screen Interval: 122'@142' | Length 20.0" | Slot: 0.020" | Type: PVC SCH. 40 Wire Wrap | Sump: 12'

Driller: V. Vazquez | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
24	42	CH	48.8	S19	24"	CLAY, TRACE LIMESTONE GRAVEL, VERY STIFF TO VERY HARD, ORANGE BROWN, SLIGHTLY ODOR TO HYDROCARBON (b)
22	42	CH	49	S20	24"	DO
24	39	--	--	S21	24"	DO
7	145	--	--	S22	14"	DO
8	50/3			S23	7"	DO
		CL	31.2			
22	0			S24	24"	DO

w% - Moisture Content
Group. Sym. - Group Symbol
PL. - Plasticity
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone, most probably

DSM Project #1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY

Well/Boring Designation : PD-24

Page: 5 of 5

Location : PENUELAS, PUERTO RICO

Date drilled: 06-24-94

T.O.C. 31.48m

G.L. 30.61m

Cement: Interval 0@118' Type: Cement & Earth

Seal Interval: 118'@120'

Type: Bentonite (Pellets)

Filter pack Interval: 120'@143' Type: Gravel

Casing Interval: 0@122'

Length 122'-0"

Dia. 2.0"ID

Type: PVC SCH. 40

Screen Interval: 122'@142'

Length 20'-0"

Slot: 0.020"

Type: PVC SCH. 40 Wire Wrap

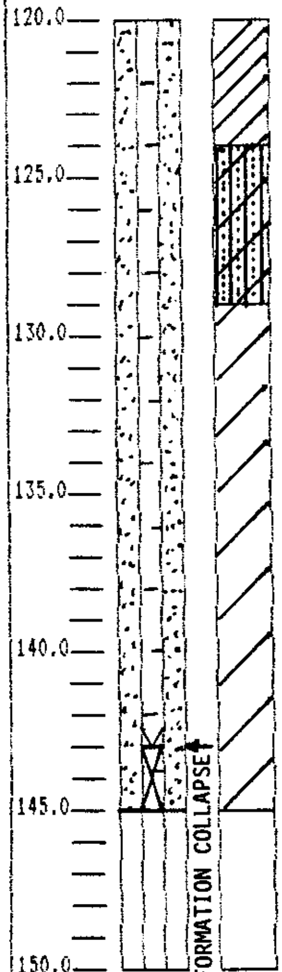
Sump: 12'

Driller: V. Vazquez

Contractor: SOIL-TECH

Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
						DO
12	50/5	--	--	S25	9"	SILTY SANDY CLAY, SOME LIMESTONE GRAVEL, VERY HARD, YELLOW/BROWN (b)
23	50/3	CH	42.8	S26	13"	CLAY, TRACE FINE LIMESTONE GRAVEL, HARD, ORANGE/BROWN (b)
--	50/1	--	--	S27	0"	
				*		
				*		
						END OF BORING 145.0'

(a) = Information not submitted

(b) = Thoroughtly weathered tertiary limestone, most probably

(*) = Sampling not attempted

w% - Moisture Content

Group. Sym. - Group Symbol

PL. - Plasticity

Samp. Num. - Sample Number

Samp. Rec. - Sample Recovery

N - Standard Penetration Test N Value

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY

Well/Boring Designation : PD-25 Page: 1 of 6

Location : PENUELAS, PUERTO RICO

Date drilled: 07-05-94

T.O.C. 43.83m G.L. 42.88m Cement: Interval 0@129' Type: Cement & Earth

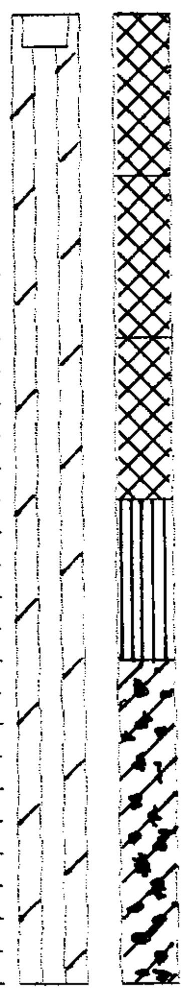
Seal Interval: 129'@133' Type: Bentonite (Pellets) Filter pack Interval: 133'@156 Type: 1/2" Gravel

Casing Interval: 0@135' Length 135'-0" Dia. 2" I.D. Type: PVC SCH. 40

Screen Interval: 135'@155' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Sump: 5.0' Wire Wrap

Driller: J. L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
0.0 – 5.0	1.7	35			S1	13"	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL AND PEBBLES, HARD, YELLOW (FILL).
5.0 – 10.0	7.4	41			S2	18"	LIMESTONE GRAVEL, SILTY CLAY POCKETS, TRACE FINE SAND, DENSE, YELLOW, BLACK SPOTS (FILL).
10.0 – 15.0	4.9	25	--	NP	S3	11"	LIMESTONE GRAVEL AND CLAYEY SILT, TRACE FINE SAND, VERY DENSE, REDDISH YELLOW (FILL).
15.0 – 20.0	7.7	55			S4	13"	SILT, TRACE CLAY, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, VERY DENSE, YELLOW, (b)
20.0 – 25.0	12.3	47	GC	32.6	S5	12"	CLAYEY GRAVEL, TRACE FINE SAND, DENSE, YELLOW/STRONG BROWN, (b)
25.0 – 30.0	31.2	42			S6	16"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY   Well/Boring Designation : PD-25   Page: 2 of 6

Location : PENUELAS, PUERTO RICO   Date drilled: 7-05-94

T.O.C. 43.83m   G.L. 42.88m   Cement: Interval 0@129′ Type: Cement & Earth

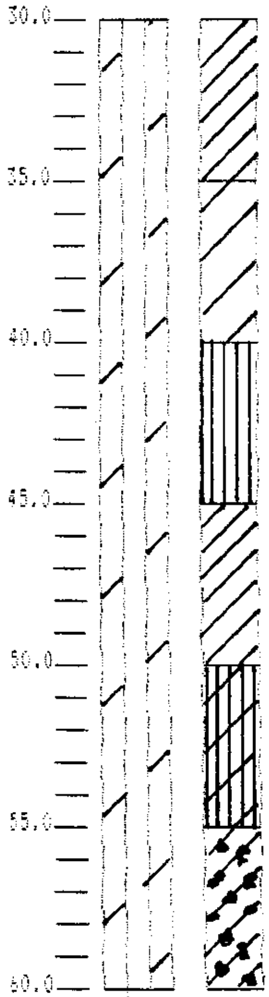
Seal Interval: 129′@133′   Type: Bentonite (Pellets)   Filter pack Interval: 133′@156′   Type: Gravel

Casing Interval: 0@135′   Length 135′-0″   Dia. 2″ I.D.   Type: PVC SCH.40

Screen Interval: 135′@155′   Length 20′-0″   Slot: 0.02″   Type: PVC SCH.40 Sump: 5.0′
Wire Wrap

Driller: J.L. Morales   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
11.6	88/11	CL	7.7	S7	10″	SILT, TRACE FINE TO MEDIUM LIMESTONE GRAVEL, TRACE CLAY, TRACE FINE SAND, VERY DENSE, YELLOW. (b)
16.9	29	CH	41.8	S8	17″	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE PEBBLES, VERY STIFF, BROWN/YELLOW. (b)
29.5	84/12			S9	10″	SILT, TRACE TO LITTLE FINE TO MEDIUM LIMESTONE GRAVEL, CLAY LUMPS, TRACE FINE SAND, VERY DENSE, YELLOW/YELLOWISH BROWN. (b)
20.3	74	CL	10.3	S10	17″	CLAYEY SILT, TRACE TO LITTLE FINE TO MEDIUM LIMESTONE GRAVEL, CLAY LUMPS, TRACE FINE SAND, VERY DENSE, YELLOW/BROWNISH YELLOW. (b)
14.1	77/12			S11	15″	CLAY AND SILT, TRACE TO LITTLE FINE TO MEDIUM LIMESTONE GRAVEL, HARD, BROWN/YELLOW. (b)
20.1	37	GC	10.9	S12	18″	CLAYEY SILT, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, HARD, YELLOW PALE/YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO SITE FACILITY Well/Boring Designation : PD-25 Page: 3 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 07-05-94

T.O.C. 43.83m G.L. 42.88m Cement: Interval 0@129' Type: Cement & Earth

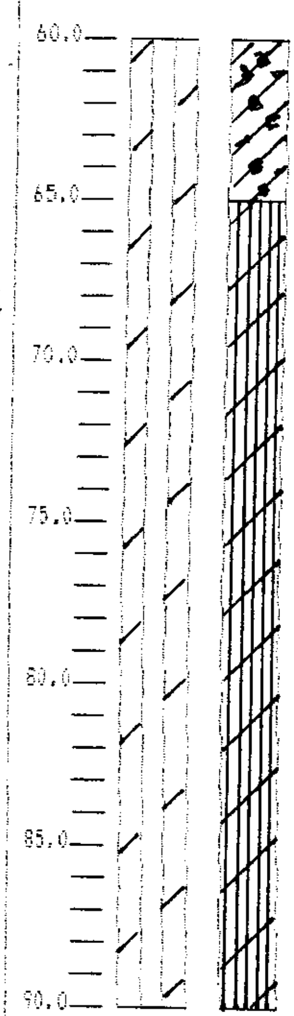
Seal Interval: 129@'133' Type: Bentonite (Pellets) Filter pack Interval: 133'@156' Type: Gravel

Casing Interval: 0@135' Length 135'-0" Dia. 2" I.D. Type: PVC SCH. 40

Screen Interval: 135'@155' Length 20'-0" Slot: 0.02" Type: PVC SHC. 40 Wire Wrap Sump: 5.0'

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



W%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
8.2	50/2			S13	3"	CLAYEY SILT, TRACE FINE SAND, OCC. LIMESTONE GRAVEL, HARD, YELLOW/PALE YELLOW. (b)
16.4	37	CL ML	4.2	S14	18"	FINE SAND, SILT, TRACE TO SOME LIMESTONE GRAVEL, VERY DENSE, TAN YELLOW. (b)
15.0	50/2			S15	3"	DO
13.8	89/9			S16	12"	DO
18.6	50/2			S17	3"	DO
9.5	50/3			S18	4"	DO

W% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-25 Page: 4 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 07-05-94

T.O.C. 43.83m G.L. 42.88m Cement: Interval 0@129 Type: Cement & Earth

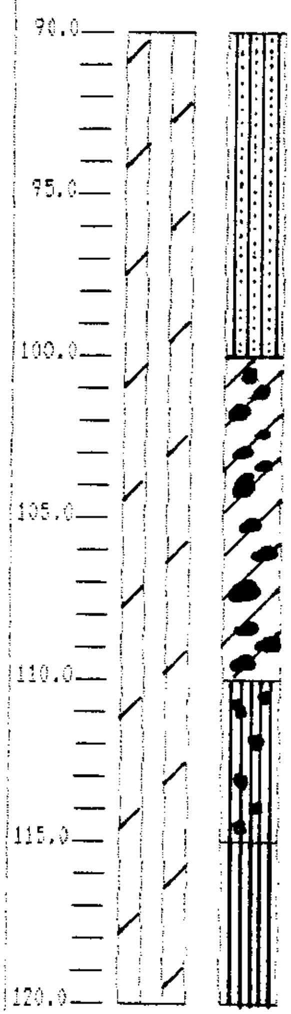
Seal Interval: 129'@133' Type: Bentonite (Pellets) Filter pack Interval: 133'@156' Type: Gravel

Casing Interval: 0@135' Length 135'-0" Dia. 2" I.D. Type: PVC SCH. 40

Screen Interval: 135'@155' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 5.0'

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
90.0–100.0	9.4	21			S19	12"	CHALKY SILTY VERY FINE SAND. MEDIUM DENSE TO VERY DENSE TAN/ WHITE (b)
	7.0	43			S20	13"	DO
100.0–110.0	17.1	50/6	SC	9.5	S21	8"	DO
	11.1	85/12			S22	9"	DO
110.0–115.0	19.3	50/4	GM	1.8	S23	4"	SILTY SAND, SOME LIMESTONE GRAVEL, VERY DENSE, YELLOW/TAN (b)
115.0–120.0	12.2	50/4			S24	13"	CLAYEY SILT, TRACE LIMESTONE GRAVEL.TRACE FINE SAND. HARD YELLOW/PALE YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-25 Page: 5 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 07-05-94

T.O.C. 43.87m G.L. 42.88m Cement: Interval 0@129' Type: Cement & Earth

Seal Interval: 129'@133' Type: Bentonite (Pellets) Filter pack Interval: 133'@156' Type: Gravel

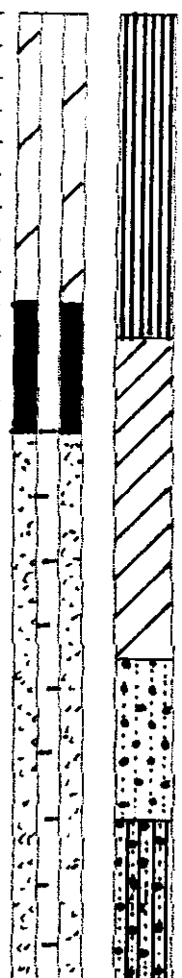
Casing Interval: 0@135' Length 135'-0" Dia. 2" I.D. Type: PVC SCH.40

Screen Interval: 135'@155' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 5.0'

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY

120.0
125.0
130.0
135.0
140.0
145.0
150.0



wZ	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
19.8	69	GM GC	5.2	S25	6"	DO
17.4	50/6			S26	5"	DO
10.4	44	GC	4.0	S27	8"	FINE TO COARSE SILTY SAND, OCC. LIMESTONE GRAVEL, MEDIUM DENSE, OLIVE YELLOW.
8.5	28			S28	15"	DO
10.2	21	SP	5.7	S29	16"	FINE TO COARSE SILTY SAND, OCC. LIMESTONE GRAVEL, MEDIUM DENSE, OLIVE YELLOW. (b)
19.6	50/5	SM SC	6.8	S30	8"	FINE SILTY SAND, TRACE CLAY, OCC. LIMESTONE GRAVEL, VERY DENSE, OLIVE YELLOW. (b)

wZ - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) Information not submitted
(b) Thoroughtly weathered tertiary limestone.

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY   Well/Boring Designation : PD-25   Page: 6of 6

Location : PENUELAS, PUERTO RICO   Date drilled: 07-05-94

T.O.C. 43.83m   G.L. 42.88m   Cement: Interval 0@129'   Type: Cement & Earth

Seal Interval: 129'@133'   Type: Bentonite (Pellets)   Filter pack Interval: 133'@160'   Type: Gravel

Casing Interval: 0@135'   Length 135'-0"   Dia. 2" I.D.   Type: PVC SCH. 40

Screen Interval: 135'@155'   Length 20'-0"   Slot: 0.020"   Type: PVC SHC.40 Wire Wrap   Sump: 5.0'

Driller: J.L. Morales   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY (depth)	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
150.0					‡		
155.0					‡		
					‡		
160.0							END OF BORING AT 160.0'
165.0							
170.0							
175.0							
180.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

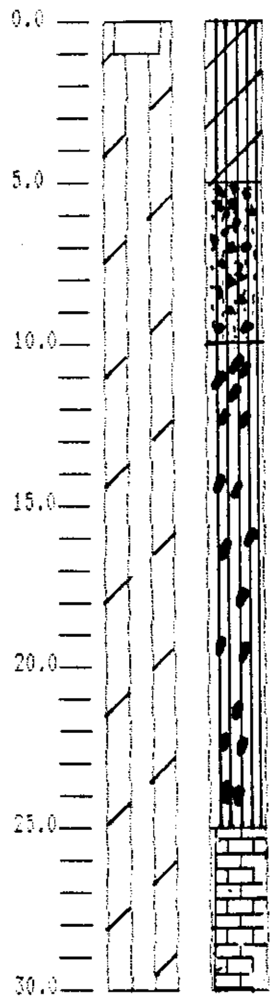
‡ = No sampling attempted

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY		Well/Boring Designation : PD-26	Page: 1 of 6
Location : PENUELAS, PUERTO RICO		Date drilled: 07-08-94	
T.O.C. 49.81m	G.L. 48.99m	Cement: Interval 0@199'	Type: Cement & Earth
Seal Interval: 149'@151'	Type: Bentonite (Pellets)	Filter pack Interval: 151'@173'	Type: Gravel
Casing Interval: 0@155'	Length 155'-0"	Dia. 2" I.D.	Type: PVC SCH.40
Screen Interval: 155'@175'	Length 20'-0"	Slot: 0.020"	Type: PVC SCH.40 Wire Wrap Sump: 5.0'
Driller: V. Vazquez	Contractor: SOIL-TECH	Logged by: Victor E. Rivera & Associates	

LITHOLOGY



wX	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
26.1	11			S1	8"	SILTY CLAY, TRACE FINE SAND, STIFF, YELLOWISH BROWN. (b)
10.8	29			S2	12"	FINE TO MEDIUM LIMESTONE GRAVEL IN A SILT/CLAY MATRIX, TRACE FINE SAND, VERY STIFF TO HARD, PALE YELLOWISH ORANGE/BROWNISH YELLOW. (b)
6.1	27			S3	13"	DO
7.6	42			S4	13"	DO
6.1	47	GM	1.7	S5	10"	DO
13.7	67/11			S6	6"	LIMESTONE GRAVEL, TRACE SILTY CLAY, FINE SAND, VERY DENSE, PALE YELLOWISH ORANGE. (b)

wX - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone.

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PO-26 Page: 2 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 07-08-94

T.O.C. 49.81m G.L. 48.99m Cement: Interval 0@149' Type: Cement & Earth

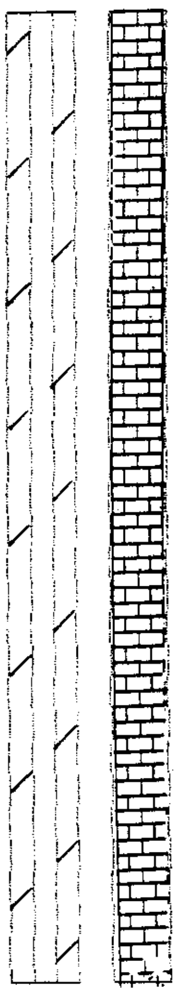
Seal Interval: 149'@151' Type: Bentonite (Pellets) Filter pack Interval: 151'@173' Type: Gravel

Casing Interval: 0@155' Length 155'-0" Dia. 2" I.D. Type: PVC SCH. 40

Screen Interval: 155'@175' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 5'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
30.0	6.1	50/5			S7	3"	LIMESTONE GRAVEL, TRACE SILTY CLAY, TRACE FINE SAND, VERY DENSE, PALE YELLOWISH ORANGE (b).
35.0	8.7	30/2			S8	1"	DO
40.0	13.5	87/10	GP GCGM	5.5	S9	9"	DO
45.0	--	50/1			S10	0"	NO RECOVERY
50.0	--	50/8			S11	0"	NO RECOVERY
55.0	10.8	86/10		3.6	S12	6"	DO
60.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USSC)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-26 Page: 3 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 07-08-94

T.O.C. 49.81m G.L. 48.99m Cement: Interval 0@149' Type: Cement & Earth

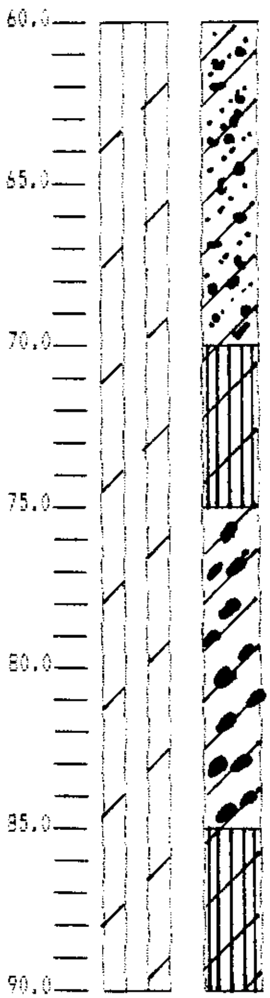
Seal Interval: 149'@151' Type: Bentonite (Pellets) Filter pack Interval: 154'@180' Type: Gravel

Casing Interval: 0@155' Length 155'-0" Dia. 2" I.D. Type: PVC SCH.40

Screen Interval: 155'@175' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Sump: 5'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
16.9	27			S13	12"	FINE TO MEDIUM LIMESTONE GRAVEL, TRACE SILTY CLAY, TRACE FINE SAND, MEDIUM DENSE, PALE YELLOWISH ORANGE/YELLOWISH BROWN.(b)
13.6	23	GP GC	6.7	S14	6"	DO
21.6	15			S15	11"	SILTY CLAY, FINE LIMESTONE GRAVEL, TRACE FINE SAND, VERY STIFF, YELLOWISH BROWN. (b)
10.5	86/9	GC	5.1	S16	12"	LIMESTONE GRAVEL, TRACE SILTY CLAY, TRACE FINE SAND, VERY DENSE, PALE YELLOWISH ORANGE. (b)
3.9	50/2			S17	1"	DO
16.9	50/3			S18	1 1/2	SILTY CLAY, TRACE FINE SAND, OCC. LIMESTONE PEBBLES, HARD, WHITE. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY — Well/Boring Designation : PD-27 — Page: 4 of 5

Location : PENUELAS, PUERTO RICO — Date drilled: 07-09-94

T.O.C. 39.35m — G.L. 38.72m — Cement: Interval 0@121' — Type: Concrete & Earth

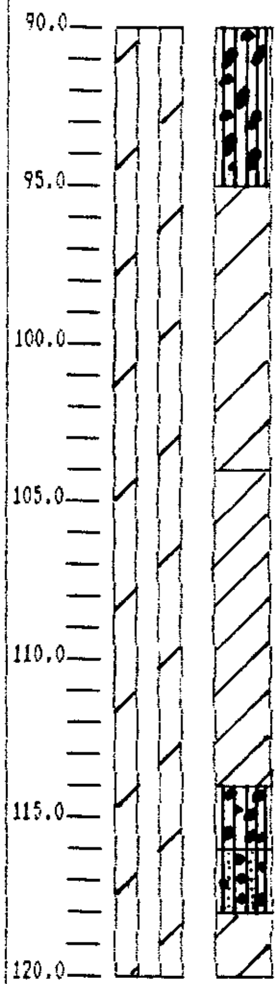
Seal Interval: 121'@123' — Type: Bentonite (Pellets) — Filter pack Interval: 123'@143' — Type: Gravel

Casing Interval: 0@125' — Length 125'-0" — Dia. 2" ID — Type: PVC SCH.40

Screen Interval: 125@145' — Length 20'-0" — Slot: 0.020" — Type: PVC SCH.40 Wire Wrap — Sump: 5'

Driller: Jose L. Morales — Contractor: SOIL-TECH — Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
14.5	32	GC	7.0	S19	13"	DO
43.3	23	CH	62.6	S20	15"	CLAY, VERY STIFF TO HARD, ORANGE (b)
43.8	24			S21	24"	DO
22.7	61	CL	20.2	S22	19"	SILT,SOME FINE SAND/OCC. CLAYEY,TRACE FINE LIMESTONE GRAVEL, DENSE, YELLOW. (b)
31.7	46			S23	24"	DO
30.5	50/5	GC	63.3	S24	8"	CLAY, VERY STIFF, BROWN. (b)
						SAND, LIMESTONE GRAVEL, VERY DENSE, YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project #1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-27 Page: 5 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 07-09-94

T.O.C. 39.35m G.L. 38.72m Cement: Interval 0@121' Type: Concrete & Earth

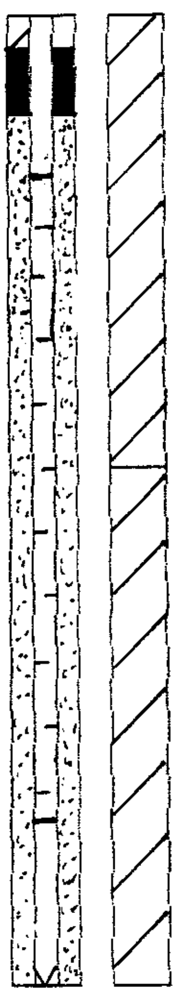
Seal Interval: 121'@123' Type: Bentonite (Pellets) Filter pack Interval: 123'@143' Type: Gravel

Casing Interval: 0@125' Length 125'-0" Dia. 2"ID Type: PVC SCH.40

Screen Interval: 125@145' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 5'

Driller: Jose L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
42.3	17	CH	38.6	S25	24"	CLAY, VERY STIFF TO HARD, GRAYISH BROWN, SLIGHT ODOR TO HYDROCARBON. (b)
44.4	19	CH	58.3	S26	24"	DO
49.6	41	CH	57.6	S27	22"	DO
				*		
20.6	50/2			S28	1"	GRAVELLY CLAY, HARD, BROWN
				*		
				*		END OF BORING AT 150.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone
* = No sampling was attempted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-28 Page: 1 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 07-14-94

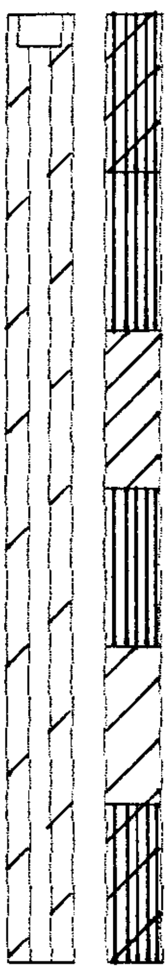
T.O.C. 25.51m G.L. 24.67m Cement Interval: 0@69' Type: Concrete & Earth

Seal Interval: 69'@72' Type: Bentonite (Pellets) Filter pack Interval: 72@93' Type: Gravel

Casing Interval: 0'@75' Length 75'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 75'@95' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 5'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates



Depth	LITHOLOGY w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
0.0 – 5.0	18.2	12			S1	13"	SILTY CLAY, TRACE FINE TO MEDIUM SAND, OCC. LIMESTONE GRAVEL, STIFF,YELLOWISH BROWN/PALE YELLOW. (b)
5.0 – 10.0	17.5	54			S2	18"	CLAYEY SILT, TRACE FINE SAND, OCC. LIMESTONE PEBBLES,HARD,YELLOW. (b)
10.0 – 15.0	16.2	46	CL	8.9	S3	15"	SILT, SOME CLAY, LIMESTONE PEBBLES, TRACE FINE SAND,DENSE, YELLOW/YELLOWISH BROWN. (b)
15.0 – 20.0	13.2	56/12			S4	8"	CLAYEY SILT, CLAY POCKETS, TRACE FINE SAND, OCC. LIMESTONE PEBBLES, HARD, PALE YELLOW/BROWNISH YELLOW. (b)
20.0 – 25.0	42.2	29	CH	68.9	S5	22"	CLAY, TRACE FINE SAND, HARD, YELLOWISH BROWN/BLACK SPOTS (b)
25.0 – 30.0	17.7	21			S6	23"	SILTY CLAY, SOME LIMESTONE GRAVEL, TRACE FINE SAND, VERY STIFF, YELLOWISH BROWN/YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone.

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY — Well/Boring Designation : PD-28 — Page: 2 of 4

Location : PENUELAS, PUERTO RICO — Date drilled: 07-14-94

T.O.C. 25.51m — G.L. 24.67m — Cement: Interval 0@69' — Type: Concrete & Earth

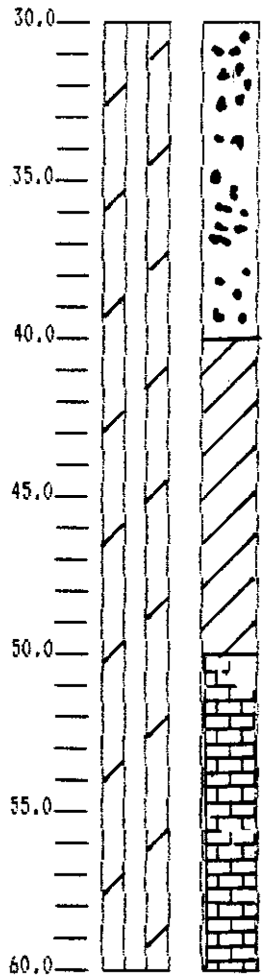
Seal Interval: 69'@72' — Type: Bentonite (Pellets) — Filter pack Interval: 72'@93' — Type: Gravel

Casing Interval: 0'@75' — Length 75'-0" — Dia. 2"ID — Type: PVC SCH. 40

Screen Interval: 75'@95' — Length 20'-0" — Slot: 0.020" — Type: PVC SCH. 40 Wire Wrap — Sump: 5'

Driller: V. Vazquez — Contractor: SOIL-TECH — Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
7.9	50/5	GP	6.4	S7	3"	LIMESTONE GRAVEL, CLAYEY SILT, TRACE FINE SAND, VERY DENSE, VERY PALE ORANGE/BROWNISH YELLOW/YELLOW. (b)
7.8	50/5			S8	3"	DO
14.0	50/5	CL	28.3	S9	3"	DO
9.3	50/3			S10	1"	DO
15.1	50/5			S11	4"	LIMESTONE GRAVEL, SANDY SILT, TRACE CLAY, VERY DENSE, DARK YELLOWISH ORANGE/YELLOW (b).
10.4	67/10			S12	14"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-28 Page: 3 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 07-14-94

T.O.C. 25.51m G.L. 24.67m Cement Interval: 0@69' Type: Concrete & Earth

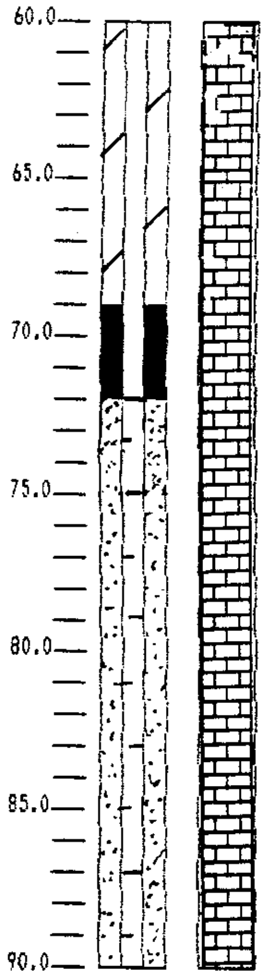
Seal Interval: 69@72' Type: Bentonite (Pellets) Filter pack Interval: 72'@93' Type: Gravel

Casing Interval: 0'@75' Length 75'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 75'@95' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



wZ	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
10.3	50/3	GP GMGS	5.8	S13	2"	LIMESTONE GRAVEL, SANDY SILT, TRACE CLAY, VERY DENSE, DARK YELLOWISH ORANGE/YELLOW (b)
--	50/1			S14	0"	NO RECOVERY
--	50/5			S15	0"	NO RECOVERY
9.1	50/5			S16	1/2"	DO
--	50/1			S17	0"	NO RECOVERY
--				*	--	

wZ - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone
* = No sampling attempted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-28 Page: 4 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 07-14-94

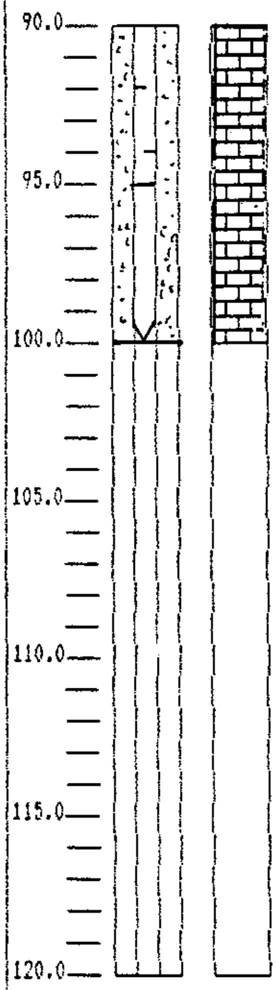
T.O.C. 25.51m G.L. 24.67m Cement Interval: 0@69' Type: Concrete & Earth

Seal Interval: 69'@72' Type: Bentonite (Pellets) Filter pack Interval: 72'@93' Type: Gravel

Casing Interval: 0'@75' Length 75'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 75'@95' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 5'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates



Depth	LITHOLOGY	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
90.0		14.3	50/5			S19	3"	DO
95.0						*	--	
						*	--	
100.0								END OF BORING AT 100.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone
(*) = No sampling was attempted

DSM Project # 1012-02

D S M E n v i r o n m e n t a l S e r v i c e s , I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-29 Page: 1 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 07-14-94

T.O.C. 34.31m G.L. 33.47m Cement Interval: 0@104' Type: Concrete & Earth

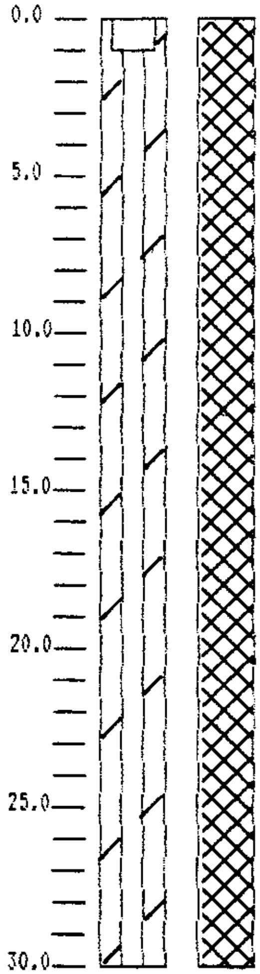
Seal Interval: 104'@107' Type: Bentonite (Pellets) Filter pack Interval: 107'@123' Type: Gravel

Casing Interval: 0'@110' Length 110'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 110'@130' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5'

Driller: Jose L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
14.5	6			S1	4"	CLAY, SOME SAND AND LIMESTONE GRAVEL, OCC. SILTY, STIFF VERY STIFF BROWN/YELLOW/TAN (PROBABLE FILL)
13.2	17			S2	15"	DO
15.1	18	GP GC	21.8	S3	10"	DO
14.7	11			S4	12"	DO
16.8	14	GP	16.8	S5	18"	DO
27.3	13			S6	19"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-29 | Page: 2 of 5

Location : PENUELAS, PUERTO RICO | Date drilled: 07-14-94

T.O.C. 34.31m | G.L. 33.47m | Cement Interval: 0@104' | Type: Concrete & Earth

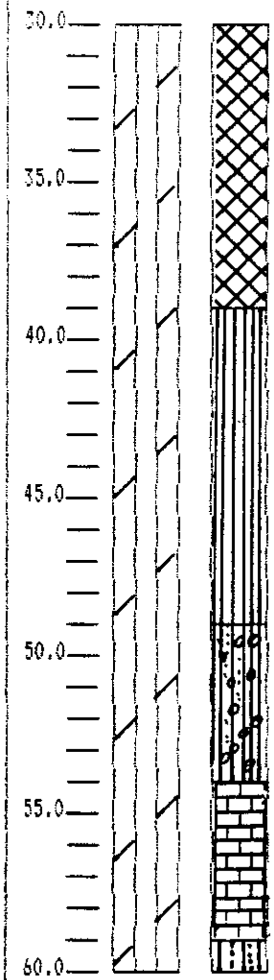
Seal Interval: 104'@107' | Type: Bentonite (Pellets) | Filter pack Interval: 107'@128' | Type: Gravel

Casing Interval: 0'@110' | Length 110'-0" | Dia. 2" ID | Type: PVC SCH. 40

Screen Interval: 110'@130' | Length 20'-0" | Slot: 0.020" | Type: PVC SCH.40 Wire Wrap | Sump: 5'

Driller: Jose L. Morales | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
15.3	9			S7	4"	CLAY, SOME SAND AND LIMESTONE GRAVEL, OCC. SILTY, STIFF TO VERY STIFF BROWN/YELLOW/TAN, LIGHT TO MODERATE ODOR TO HYDROCARBON (PROBABLE FILL)
15.3	18			S8	10"	DO
10.5	19	GM GC	6.1	S9	9"	SILT, MEDIUM SAND, TRACE TO SOME LIMESTONE GRAVEL, MEDIUM YELLOW/TAN. (b)
9.1	17			S10	9"	DO
8.0	65	GC GM	3.5	S11	12"	MEDIUM SAND, FINE LIMESTONE GRAVEL, OCC., SILTY, VERY DENSE, YELLOW.
8.1	50/2			S12	2"	LIMESTONE GRAVEL, SAND, VERY DENSE, ORANGE BROWN/YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY
Well/Boring Designation : PD-29
Page: 3 of 5

Location : PENUELAS, PUERTO RICO
Date drilled: 07-14-94

T.O.C. 34.31m
G.L. 33.47m
Cement Interval: 0@104'
Type: Concrete & Earth

Seal Interval: 104'@107'
Type: Bentonite (Pellets)
Filter pack Interval: 107'@129'
Type: Gravel

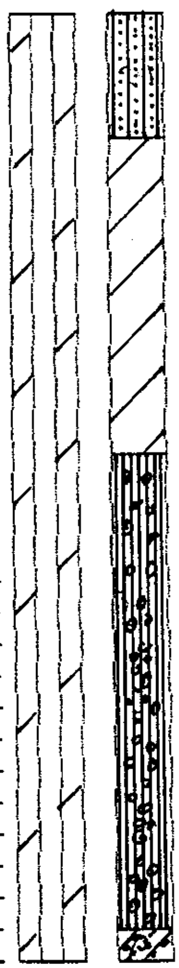
Casing Interval: 0'@110'
Length 110'-0"
Dia. 2"ID
Type: PVC SCH. 40

Screen Interval: 110'@150'
Length 20'-0"
Slot: 0.020"
Type: PVC SCH.40 Wire Wrap
Sump: 5'

Driller: J.I. Morales
Contractor: SOIL-TECH
Logged by: Victor E. Rivera & Associates

LITHOLOGY

60.0 – 65.0 – 70.0 – 75.0 – 80.0 – 85.0 – 90.0



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
13.0	50/3			S13	10"	VERY FINE SAND, SILT, VERY DENSE, ORANGE/YELLOW. (b)
17.0	86/9	CH	32.1	S14	15"	CLAY, TRACE TO SOME FINE SAND, VERY HARD, ORANGE BROWN. (b)
16.7	50/4			S15	12"	DO
6.3	50/3			S16	2"	FINE TO MEDIUM SAND, SILT, TRACE TO SOME LIMESTONE GRAVEL, VERY DENSE, YELLOW/TAN. (b)
2.3	50/2			S17	3"	DO
5.6	50/3			S18	2"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-29 Page: 4 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 07-14-94

T.O.C. 34.31M G.L. 33.47M Cement Interval: 0@104' Type: Concrete & Earth

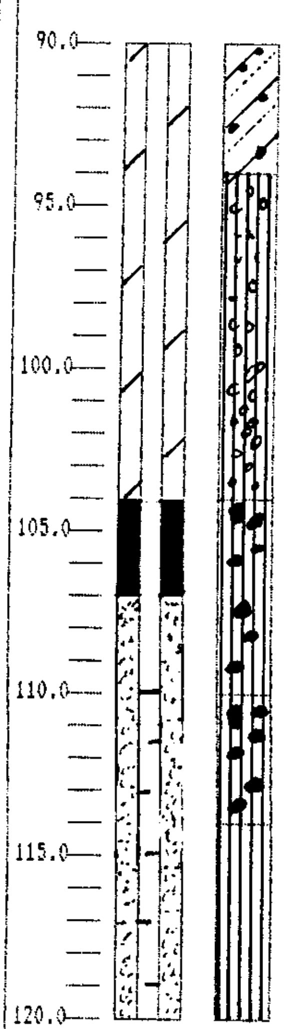
Seal Interval: 104'@107' Type: Bentonite (Pellets) Filter pack Interval: 107'@128' Type: Gravel

Casing Interval: 0'@110' Length 110'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 110'@130' Length 20'-0" Slot: 0.020 Type: PVC SCH. 40 Wire Wrap Sump: 5'

Driller: Jose L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
2.3	50/6			S19	6"	FINE TO MEDIUM SAND, SOME CLAY POCKETS, TRACE LIMESTONE GRAVEL, VERY DENSE, WHITE/YELLOW/ORANGE. (b)
7.2	50/1			S20	1 1/2	FINE SANDY SILT, TRACE TO SOME FINE LIMESTONE GRAVEL, VERY DENSE YELLOW (b)
9.8	50/2			S21	2"	DO
19.5	50/5	GC	30.3	S22	5"	SAND, LIMESTONE GRAVEL IN A CLAYEY MATRIX, VERY HARD TAN/ORANGE/BROWN. (b)
15.8	50/5			S23	5"	SAND, LIMESTONE GRAVEL IN A CLAYEY MATRIX, VERY DENSE TAN/ORANGE/BROWN, SLIGHTLY TO MODERATE ODOR TO HYDROCARBON WET. (b)
13.0	50/2	GC	12.0	S24	2"	SILT, MEDIUM SAND, FINE LIMESTONE GRAVEL, VERY DENSE, YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-29 Page: 5 of 5

Location : PENUELAS, PUERTO RICO Date drilled: 07-14-94

T.O.C. 34.31m G.L. 33.47m Cement Interval: 0@104' Type: Concrete & Earth

Seal Interval: 104'@107' Type: Bentonite (Pellets) Filter pack Interval: 107'@128' Type: Gravel

Casing Interval: 0'@110' Length 110'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 110'@130' Length 20'-0" Slot: 0.020 Type: PVC SCH. 40 Wire Wrap Sump: 5'

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

Depth	LITHOLOGY	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
120.0		17.4	50/4	CL	21.2	S25	8"	CLAY, TRACE FINE SAND AND LIMESTONE GRAVEL, VERY DENSE, YELLOW/ BROWN/TAN, SLIGHT ODOR TO HYDROCARBON. (b)
125.0		11.1	50/6			S26	12"	COARSE SAND, MEDIUM LIMESTONE GRAVEL IN A CLAYEY MATRIX, VERY HARD, YELLOW SLIGHT ODOR TO HYDROCARBON - WET. (b)
130.0						*		
						*		
135.0								END OF BORING AT 135.0'
140.0								
145.0								
150.0								

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Throughtly weathered tertiary limestone
(*) = No sampling attempted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY   Well/Boring Designation : PD-30   Page: 1 of 4

Location : PENUELAS, PUERTO RICO   Date drilled: 06-13-94

T.O.C. 25.47m   G.L. 24.59m   Cement: Interval 0@76'   Type: Concrete & Earth

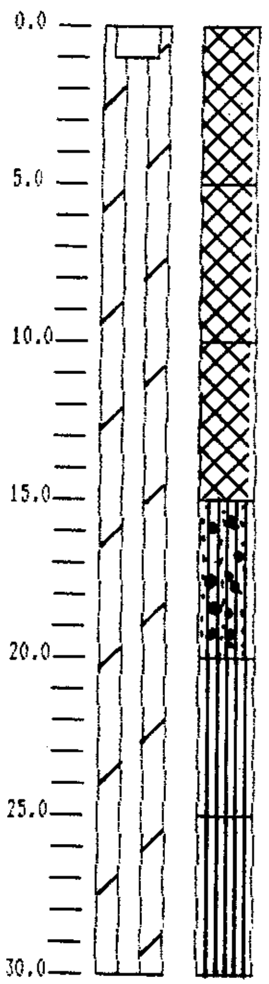
Seal Interval: 76'@78'   Type: Bentonite (Pellets)   Filter pack Interval: 78'@102'   Type: Gravel

Casing Interval: 0'@80'   Length 80'-0"   Dia. 2" ID   Type: PVC SCH. 40

Screen Interval: 80'@100'   Length 20'-0"   Slot: 0.020"   Type: PVC SCH. 40 Sump: 5' Wire Wrap

Driller: Jose L. Morales   Contractor: SOIL-TECH   Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
8.9	8			S1	11"	SILTY CLAY, LIMESTONE GRAVEL, TRACE FINE SAND, OCC. ROOTS, MEDIUM, YELLOWISH BROWN. (PROBABLE FILL)
18.7	7			S2	17"	SILTY CLAY AND LIMESTONE GRAVEL, TRACE TO MEDIUM FINE SAND, STIFF, DARK YELLOWISH BROWN. (PROBABLE FILL)
20.7	5	CL	21.2	S3	20"	CLAYEY SANDY SILT, MEDIUM, LIGHT YELLOWISH BROWN-MODERATE ODOR TO HYDROCARBON. (PROBABLE FILL)
6.0	37			S4	18"	FINE TO MEDIUM GRAVEL, TRACE CLAYEY SILT, TRACE FINE SAND, DENSE, PALE YELLOWISH ORANGE. (b)
9.8	66	CL ML	6.2	S5	24"	CLAYEY SILT, CLAY LUMPS, TRACE FINE SAND AND LIMESTONE GRAVEL, HARD, YELLOW/BROWNISH YELLOW, SLIGHT ODOR TO HYDROCARBON. (b)
21.7	71/10			S6	14"	SILTY CLAY, LIMESTONE GRAVEL, TRACE FINE SAND, HARD, YELLOWISH BROWN/PALE YELLOWISH ORANGE. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-30 Page: 2 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-13-94

T.O.C. 25.47m G.L. 24.59m Cement: Interval 0@76' Type: Concrete & Earth

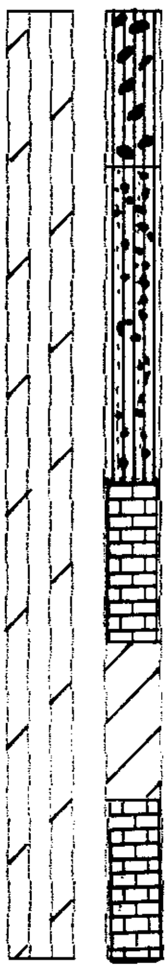
Seal Interval 76'@78' Type: Bentonite (Pellets) Filter pack Interval: 78'@102' Type: Gravel

Casing Interval: 0'@80' Length 80'-0" Dia. 2"ID Type: PVC SCH.40

Screen Interval: 80'@100' Length 20'-0' Slot: 0.020" Type: PVC SCH.40 Sump: 5' Wire Wrap

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
30.0	16.7	78/10	GC	33.3	S7	13"	LIMESTONE GRAVEL IN A SILTY CLAY MATRIX, SOME FINE SAND, VERY HARD, PALE YELLOWISH ORANGE/YELLOWISH BROWN. (b)
35.0	6.2	72			S8	21"	FINE TO MEDIUM SAND AND LIMESTONE GRAVEL, VERY DENSE, PALE YELLOWIS ORANGE. (b)
40.0	2.5	85	GM GC	6.1	S9	19"	DO
45.0	9.4	50/5			S10	6"	LIMESTONE GRAVEL, SILTY CLAY LUMPS, TRACE FINE SAND, VERY DENSE, PALE YELLOWISH ORANGE (b)
50.0	36	84/10	CL	55.1	S11	11"	CLAY, HARD, BROWN (b)
55.0	9.4	50/3			S12	4"	LIMESTONE GRAVEL, TRACE CLAYEY SILT, TRACE FINE SAND, VERY DENSE, PALE YELLOWISH ORANGE (b)
60.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-30 Page: 3 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-13-94

T.O.C. 25.47m G.L. 24.59m Cement: Interval 0@76' Type: Concrete & Earth

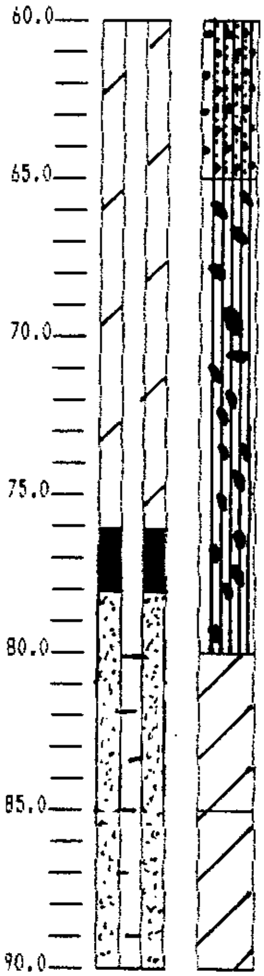
Seal Interval: 76'@78' Type: Bentonite (Pellets) Filter pack Interval: 78'@102' Type: Gravel

Casing Interval: 0'@80' Length 80'-0" Dia. 2"ID Type: PVC SCH.40

Screen Interval: 80'@100' Length 20'-0" Slot: 0.020" Type: PVC SCH.40 Wire Wrap Sump: 5'

Driller: Jose L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
10.3	50/5	SM SC	6.8	S13	5"	SANDY SILT, LIMESTONE FRAGMENTS, VERY FEW CLAY LUMPS, DENSE, (b) PALE YELLOWISH ORANGE
--						
--				*		
14.7	90/9	GC	10.3	S14	24"	SANDY LIMESTONE GRAVEL, MANY CLAY LUMPS, VERY DENSE, PALE YELLOWISH/ORANGE YELLOWISH BROWN (b)
29.8	48	CH	39.6	S15	24"	CLAY, HARD, OLIVE BROWN (b)
22.5	63	CH	58.2	S16	24"	CLAY, SOME FINE SAND AND LIMESTONE GRAVEL, HARD, BROWNISH YELLOW. (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = information not submitted
(b) = Thoroughly weathered tertiary limestone
(*) = Sampling not attempted

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-30 Page: 4 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-13-94

T.O.C. 25.47m G.L. 24.59m Cement: Interval 0@76' Type: Concrete & Earth

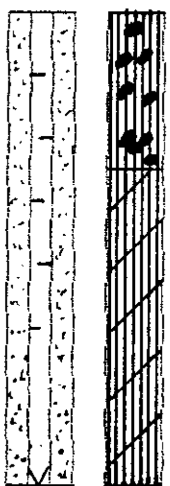
Seal Interval: 76'@78' Type: Bentonite (Pellets) Filter pack Interval: 78'@102' Type: Gravel

Casing Interval: 0'@80' Length 80'-0' Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 80'@100' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5'

Driller: J.L. Morales Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
90.0	23.1	50/1	GC	13.0	S17	(a)	DO
95.0	25.2	98/10			S18	18"	SILTY CLAY AND FINE TO MEDIUM LIMESTONE GRAVEL, TRACE FINE SAND, VERY HARD, BROWNISH YELLOW/ PALE YELLOWISH ORANGE. (b)
100.0	39.8	75/10				(a)	DO
105.0							END OF BORING AT 105'-0"
110.0							
115.0							
120.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-31 Page: 1 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-22-94

T.O.C. 37.47m G.L. 36.51m Cement Interval 0@91' Type: Concrete & Earth

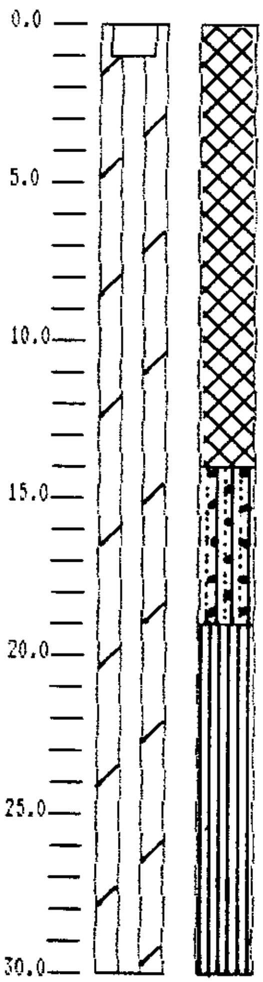
Seal Interval: 91'@94' Type: Bentonite (Pellets) Filter pack Interval: 94'@117' Type: Gravel

Casing Interval: 0'@97' Length 97'-0" Dia. 2" ID Type: PVC SCH. 40

Screen Interval: 97'@117' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
6.5	36			S1	11"	SILT,SAND,LIMESTONE GRAVEL, MEDIUM LOOSE TO MEDIUM BROWN/YELLOW (PROBABLE FILL)
4.5	11			S2	5"	DO
8.0	11		NP	S3	21"	DO
8.2	18			S4	6"	MEDIUM SAND,SOME SILT,TRACE FINE LIMESTONE GRAVEL, MEDIUM,YELLOW (b)
8.2	30	CL	2.5	S5	14"	CHALKY SILT, TRACE TO SOME VERY FINE SAND, DENSE TO VERY DENSE, WHITE (b)
9.2	81			S6	15"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-31 Page: 2 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-22-94

T.O.C. 37.47m G.L. 36.51m Cement: Interval 0@91' Type: Concrete & Earth

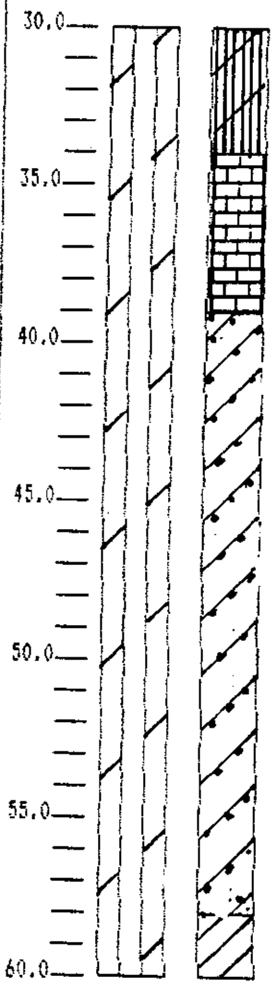
Seal Interval: 91'@94' Type: Bentonite (Pellets) Filter pack Interval: 95'@117' Type: Gravel

Casing Interval: 0'@97' Length 97'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 97'@117' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
10.4	50/4	CLML	5.5	S7	18"	DO
6.7	50/6		NP	S8	9"	LIMESTONE GRAVEL, SOME SAND, FEW CLAY POCKETS, VERY DENSE, WHITE /RED (b)
9.8	66			S9	18"	GRAVELLY CLAY, TRACE TO SOME SAND, VERY HARD, REDDISH BROWN/WHITE (b)
10.8	72/11	SC	27.9	S10	10"	DO
11.1	86/11			S11	8"	DO
2.3	50/5			S12	3"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY — Well/Boring Designation : PD-31 — Page: 3 of 4

Location : PENUELAS, PUERTO RICO — Date drilled: 06-22-94

T.O.C. 37.47m — G.L. 36.51m — Cement Interval: 0@91' — Type: Concrete & Earth

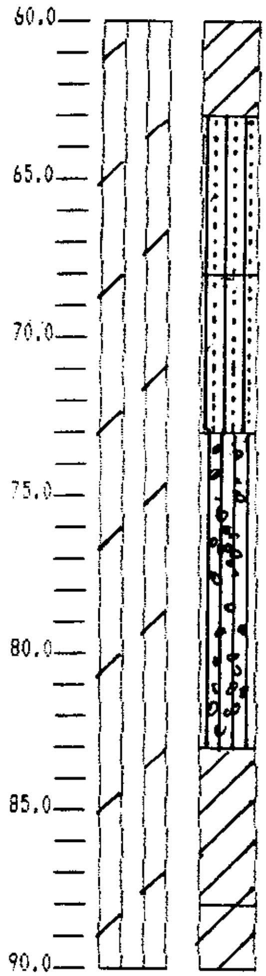
Seal Interval: 91'@94' — Type: Bentonite (Pellets) — Filter pack Interval: 94'@117' — Type: Gravel

Casing Interval: 0'@97' — Length 97'-0" — Dia. 2" ID — Type: PVC SCH. 40

Screen Interval: 97'@117' — Length 20'-0" — Slot: 0.020" — Type: PVC SCH. 40 Wire Wrap — Sump: 12'

Driller: V. Vazquez — Contractor: SOIL-TECH — Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
8.1	80	CL	24.8	S13	19"	CLAY, SOME LIMESTONE GRAVEL, HARD, RED/YELLOW (b)
3.5	50/5			S14	3"	SILTY SAND AND LIMESTONE GRAVEL,VERY DENSE, YELLOW/WHITE (b)
5.1	50/4			S15	3"	SILTY SAND AND LIMESTONE GRAVEL, FEW CLAY POCKETS, VERY DENSE YELLOW/RED MOTTLED. (b)
3.5	50/4			S16	4"	MEDIUM SAND, SOME SILT, MANY LIMESTONE GRAVEL, VERY DENSE, YELLOW WHITE. (b)
2.7	50/4			S17	3"	DO
9.5	50/6	CL	31.8	S18	5"	SILT, SOME FINE SAND, TRACE LIMESTONE GRAVEL, VERY DENSE, YELLOW /WHITE, SLIGHT ODOR TO HYDROCARBON (b)

w% - Moisture Content
Group. Sym. - Group Symbol(USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughly weathered tertiary limestone

DSM Project #1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY Well/Boring Designation : PD-31 Page: 4 of 4

Location : PENUELAS, PUERTO RICO Date drilled: 06-22-94

T.O.C. 37.47m G.L. 36.51m Cement Interval: 0@91' Type: Concrete & Earth

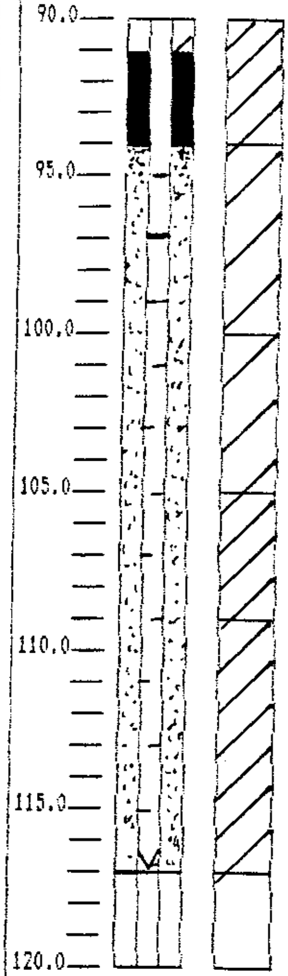
Seal Interval: 91'@94' Type: Bentonite (Pellets) Filter pack Interval: 95'@117' Type: Gravel

Casing Interval: 0'@97' Length 97'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 97'@117' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 12'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
35.2	71/11			S19	24"	SANDY, GRAVELLY CLAY, HARD, YELLOW/RED MOTTLED (b)
24.2	88/10			S20	8"	CLAY, SOME LIMESTONE GRAVEL, HARD, -RED/BROWN, SLIGHT ODOR TO HYDROCARBON (b)
19.3	57	CH	51.4	S21	24"	CLAY, VERY STIFF TO HARD, REDDISH BROWN, SLIGHT ODOR TO HYDROCARBON (b)
22.5	50/5	CL	24.9	S22	4"	CLAY, FEW LIMESTONE GRAVEL, VERY HARD, REDDISH BROWN, SLIGHT ODOR TO HYDROCARBON (b)
28.2	66/4	CL	20.1	S23	12"	GRAVELLY CLAY, VERY STIFF TO HARD, RED/BROWN, SLIGHT TO MODERATE ODOR TO HYDROCARBON.
14.2	50/5			S24	5"	DO
						END OF BORING AT 117.0'

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PL. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY | Well/Boring Designation : PD-32 | Page: 1 of 6

Location : PENUELAS, PUERTO RICO | Date drilled: 06-29-94

T.O.C. 48.29m | G.L. 47.38m | Cement Interval: 0@145' | Type: Concrete & Earth

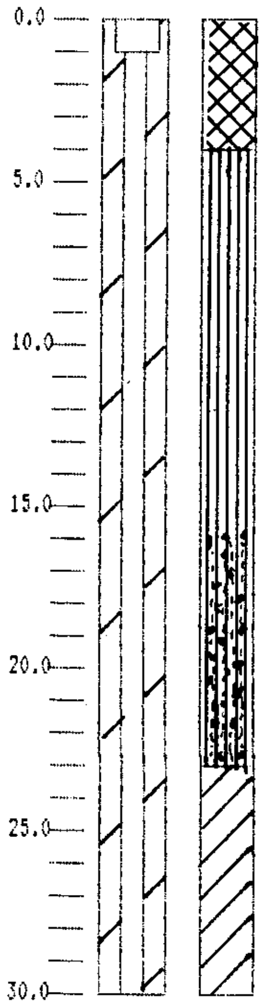
Seal Interval: 145'@148' | Type: BENTONITE (PELLETS) | Filter pack Interval: 148'@166' | Type: Gravel

Casing Interval: 0'@150' | Length 150'-0" | Dia. 2"ID | Type: PVC SCH. 40

Screen Interval: 150'@170' | Length 20'-0" | Slot: 0.020" | Type: PVC SCH.40 Wire Wrap | Sump: 5.0'

Driller: V. Vazquez | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
6.9	19			S1	14"	CLAYEY SAND AND LIMESTONE GRAVEL, MEDIUM, PALE BROWN (PROBABLE FILL)
7.2	87			S2	12"	CHALKY SILT, TRACE FINE SAND, FINE LIMESTONE GRAVEL, DENSE TO VERY DENSE, TAN WHITE. (b)
5.2	66	ML	1.0	S3	15"	DO
4.5	38	GP GM	NP	S4	12"	DO
7.3	67			S5	16"	DO
12.2	79/11	CL	16.4	S6	15"	CHALKY SILT, SOME CLAYEY POCKETS, TRACE TO SOME FINE SAND AND LIMESTONE GRAVEL, VERY DENSE, YELLOW (b)

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Throughtly weathered tertiary limestone

DSM Project # 1012-02

D S M   E n v i r o n m e n t a l   S e r v i c e s ,   I n c .

Company: CORCO FACILITY | Well/Boring Designation : PD-32 | Page: 2 of 6

Location : PENUELAS, PUERTO RICO | Date drilled: 06-29-94

T.O.C. 48.29m | G.L. 47.38m | Cement: Interval 0@145' | Type: Concrete & Earth

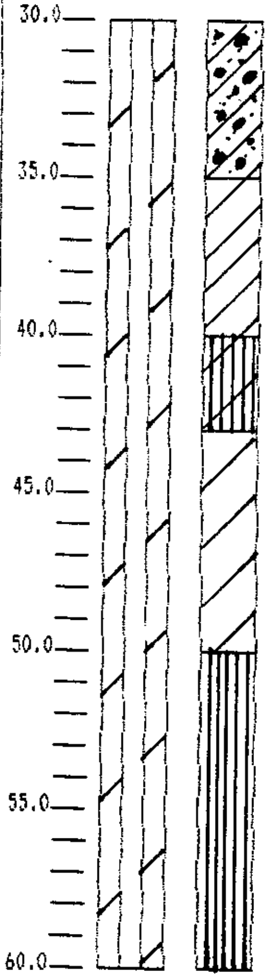
Seal Interval: 145'@148' | Type: BENTONITE (PELLETS) | Filter pack Interval: 148'@166' | Type: Gravel

Casing Interval: 0'@150' | Length 150'-0' | Dia. 2"ID | Type: PVC SCH. 40

Screen Interval: 150'@170' | Length 20'-0" | Slot: 0.020" | Type: PVC SCH. 40 Wire Wrap | Sump: 5.0'

Driller: V. Vazquez | Contractor: SOIL-TECH | Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
19.3	80/11			S7		GRAVELLY SANDY CLAY, HARD, RED/BROWN WHITE MOTTLED.(b)
13.5	48	CL	5.2	S8	17"	CHALKY SILT, TRACE FINE SAND AND LIMESTONE GRAVEL, DENSE, TAN WHITE, MODERATE ODOR TO HYDROCARBON (b)
12.5	85/10			S9	16"	CLAYEY SILT, SOME SAND AND LIMESTONE GRAVEL, VERY DENSE, GRAY/WHITE, MODERATE ODOR TO HYDROCARBONS. (b)
42.6	18	CH	37.1	S10	24"	CLAY, VERY STIFF TO HARD, ORANGE BROWN.(b)
7.0	50/1			S11	2"	CHALKY SILT, TRACE FINE SAND, TRACE TO SOME VERY FINE LIMESTONE GRAVEL, VERY DENSE, TAN/WHITE. (b)
3.9	50/11			S12	8"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

DSM Project # 1012-02

Company: CORCO FACILITY Well/Boring Designation : PD-32 Page: 3 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 06-29-94

T.O.C. 48.29m G.L. 47.38m Cement Interval: 0@145' Type: Concrete & Earth

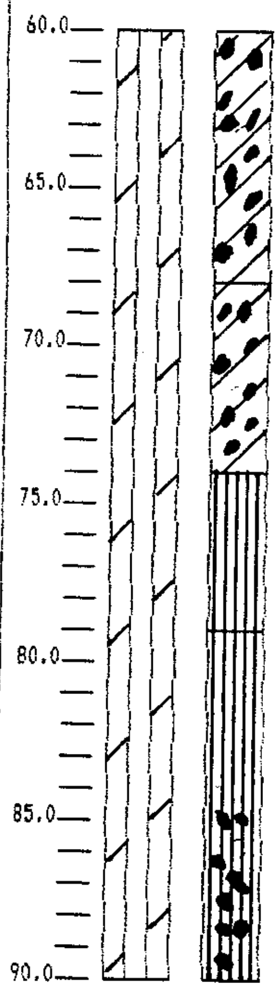
Seal Interval: 145'@148' Type: BENTONITE (PELLETS) Filter pack Interval: 148'@166' Type: Gravel

Casing Interval: 0'@150' Length 150'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 150'@170' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5.0'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
3.0	50/5	GC	13.6	S13	5"	DO
2.1	75/9			S14	7"	DO
5.5	37	GC	10.2	S15	12"	CHALKY SILT, TRACE FINE SAND, TRACE TO SOME VERY FINE LIMESTONE GRAVEL, SOME CLAY POCKETS, DENSE, TAN/WHITE, STRONG ODOR TO HYDROCARBON. (b)
4.4	50/3			S16	6"	CHALKY SILT, OCC. SANDY, OTHER FINE LIMESTONE GRAVEL, VERY DENSE, WHITE/YELLOW, SLIGHT ODOR TO HYDROCARBON. (b)
3.9	50/6			S17	5"	CHALKY SILT, OCC. SANDY, OTHER FINE LIMESTONE GRAVEL, WHITE/ YELLOW, STRONG ODOR TO HYDROCARBON. (b)
3.9	50/6	GM GC	4.2	S18	7"	DO

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-32 Page: 4 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 06-30-94

T.O.C. 48.29m G.L. 47.38m Cement Interval: 0@145' Type: Concrete & Earth

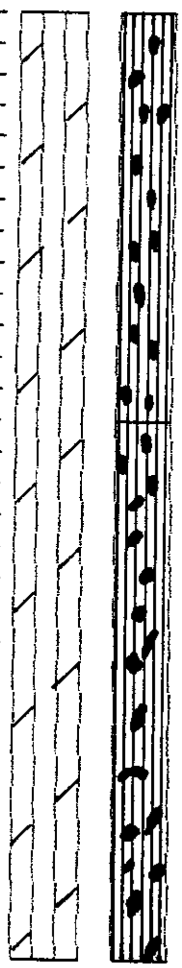
Seal Interval: 145'@148' Type: BENTONITE (PELLETS) Filter pack Interval: 148'@166' Type: Gravel

Casing Interval: 0'@150' Length 150'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 150'@170' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Sump: 5.0'
Wire Wrap

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



Depth	w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
90.0							
	3.7	94/11			S19	10"	DO
95.0							
	3.9	50/3	GC GM	6.6	S20	3"	DO
100.0							
	4.2	50/3			S21	5"	DO
105.0							
	13.5	50/2	GM	3.8	S22	4"	CHALKY SILT, TRACE TO SOME FINE SAND, VERY FEW CLAY POCKETS, TRACE LIMESTONE GRAVEL, VERY DENSE, TAN/WHITE/YELLOWISH, SLIGHT ODOR TO HYDROCARBON (b)
110.0							
	5.5	50/5			S23	8"	DO
115.0							
	8.7	50/6			S24	6"	DO
120.0							

w% - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

DSM Project # 1012-02

DSM Environmental Services, Inc.

Company: CORCO FACILITY Well/Boring Designation : PD-32 Page: 5 of 6

Location : PENUELAS, PUERTO RICO Date drilled: 06-29-94

T.O.C. 48.29m G.L. 47.39m Cement Interval:0@145' Type: Concrete & Earth

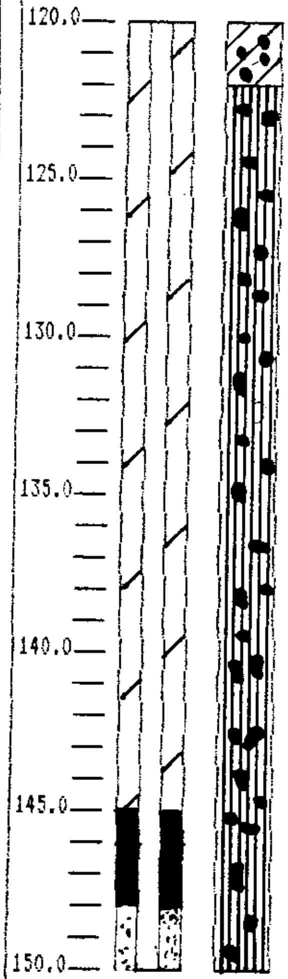
Seal Interval: 145'@148' Type: BENTONITE (PELLETS) Filter pack Interval: 148'@166' Type: Gravel

Casing Interval:0'@150' Length 150'-0" Dia. 2"ID Type: PVC SCH. 40

Screen Interval: 150'@170' Length 20'-0" Slot: 0.020" Type: PVC SCH. 40 Wire Wrap Sump: 5.0'

Driller: V. Vazquez Contractor: SOIL-TECH Logged by: Victor E. Rivera & Associates

LITHOLOGY



wX	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
7.0	50/6	GC	7.4	S25		DO
--	50/3			S26		NO RECOVERY
5.7	45	GM	2.9	S27	18"	VERY FINE TO FINE SAND, SILT, OCC. TRACE FINE LIMESTONE GRAVEL, VERY DENSE, TAN/WHITE, SLIGHT ODOR TO HYDROCARBON. (b)
12.0	88/10			S28	13"	DO
6.5	50/4	GM	1.9	S29	2"	DO
--	50/2			S30		NO RECOVERY

wX - Moisture Content
Group. Sym. - Group Symbol (USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project #1012-02

D S M Environmental Services, Inc.

Company: CORCO FACILITY — Well/Boring Designation : PD-32 — Page: 6 of 6

Location : PENUELAS, PUERTO RICO — Date drilled: 06-29-94

T.O.C. 48.29m — G.L. 47.38m — Cement Interval 0@145' Type: Concrete & Earth

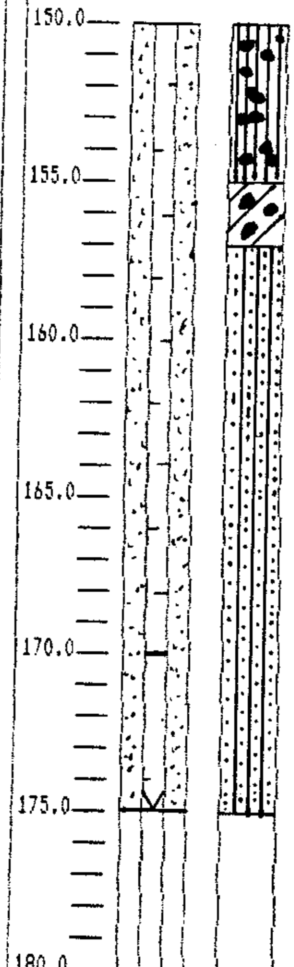
Seal Interval: 145'@148' — Type: BENTONITE (PELLETS) — Filter pack Interval: 148'@166' — Type: Gravel

Casing Interval: 0'@150' — Length 150'-0" — Dia. 2"ID — Type: PVC SCH. 40

Screen Interval: 150'@170' — Length 20'-0" — Slot: 0.020" — Type: PVC SCH. 40 Wire Wrap — Sump: 5.0'

Driller: V. Vazquez — Contractor: SOIL-TECH — Logged by: Victor E. Rivera & Associates

LITHOLOGY



w%	N	Group Sym.	PI	Samp. Num.	Samp. Rec.	Group Name/Lithology Remarks
17.4	50/6			S31	3"	DO
37.5	11	GC	15.7	S32	15"	GRAVELLY CLAY, MEDIUM STIFF, ORANGE/TAN, STRONG ODOR TO GASOLINE (b)
22.9	49	SM	2.7	S33	20"	MEDIUM TO COARSE SAND, LIMESTONE GRAVEL, MEDIUM DENSE TO DENSE, TAN YELLOW. (b)
13.2	33			S34	18"	DO
20.4	50/6			S35	(a)	DO
						END OF BORING 175.0'

w% - Moisture Content
Group. Sym. - Group Symbol(USCS)
PI. - Plasticity Index
Samp. Num. - Sample Number
Samp. Rec. - Sample Recovery
N - Standard Penetration Test N Value

(a) = Information not submitted
(b) = Thoroughtly weathered tertiary limestone

DSM Project # 1012-02

APPENDIX C

- Well Development Reports
- Level Measurement Report
- Product Characterization Report

September 27, 1994

DSM ENVIRONMENTAL SERVICES, INC.
1830 S. Kirkwood, Suite 201-A
Houston, Texas USA 77077

Attn: Mr. Tod C. Heverly
Chief Geologist

Re: Wells Development Program
CORCO Petrochemical Complex
Peñuelas, Puerto Rico

Gentlemen:

Pursuant the agreement entered into by and between DSM and this office on September 12, 1994, we are very pleased to herein submit the results of the above captioned program.

A separate report is submitted for each-one of the 32 wells developed. In case any question arise, please feel free to contact this office at your earliest convenience.

Cordially yours,

VICTOR E. RIVERA ROLDAN, P.E.

Associate

VICTOR E. RIVERA ROLDAN
INGENIERO LICENCIADO
LIC. # 5008
EXPIRA
12 AGO. 98
PUERTO RICO

VERR/vmr

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS
& CONCRETE TESTING LABORATORIES

Ponce By Pass, Km. 225.8 • Box 198, Station No. 6 • Ponce, Puerto Rico 00732 • (809) 843-6538 / 840-1340 / 840-1341 • Fax (809) 259-1604

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 12, 1994

BORING/WELL NO. PD-1

WELL DEPTH (ft.) : 25.0 {1}

WATER LEVEL DEPTH (ft.) : 3.7 {2}

HEIGHT OF WATER (ft.) : 21.3 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 3.506 GALLONS

TYPE OF BAILER = 36"L x 1.5"ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	30.2 C	6.94	8.83 mS/cm
SECOND VOLUME	30.4 C	6.94	8.87 mS/cm
THIRD VOLUME	30.2 C	7.01	8.60 mS/cm
FOURTH VOLUME	30.3 C	7.01	8.80 mS/cm
FIFTH VOLUME	30.4 C	7.01	8.82 mS/cm

REMARKS : WATER OF LOW TURBIDITY (CLEAR). WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : VICTOR E. RIVERA ROLDAN, P.E.

SUPERVISED BY : VICTOR E. RIVERA ROLDAN, P.E.

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 12, 1994

BORING/WELL NO. PD-2

WELL DEPTH (ft.) : 25.0 {1}

WATER LEVEL DEPTH (ft.) : 7.9 {2}

HEIGHT OF WATER (ft.) : 17.1 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.805 GALLONS

TYPE OF BAILER = 36"L x 1.5"ID. (TEFLON)
VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	32.7 C	6.79	7.74 mS/cm
SECOND VOLUME	30.7 C	7.01	5.95 mS/cm
THIRD VOLUME	31.2 C	7.16	6.89 mS/cm
FOURTH VOLUME	31.5 C	7.20	5.78 mS/cm
FIFTH VOLUME	31.4 C	7.33	5.47 mS/cm

REMARKS : WATER OF GRAY COLOR AND FINE SOILS - WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : RAFAEL RUIZ

SUPERVISED BY : JOSE R. RIVERA NAZARIO, P.E.

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-3

WELL DEPTH (ft.) : 25.0 {1}

WATER LEVEL DEPTH (ft.) :5.6 {2}

HEIGHT OF WATER (ft.) :19.4 {3} = [{1}-{2}]

VOLUME OF WATER : {3} X 0.165 = 3.218 GALLONS

TYPE OF BAILER = 36"L x 1.5"ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	32.2 C	6.97	35.8 mS/cm
SECOND VOLUME	31.8 C	6.87	41.7 mS/cm
THIRD VOLUME	31.7 C	6.90	42.7 mS/cm
FOURTH VOLUME	32.4 C	6.93	45.8 mS/cm
FIFTH VOLUME	32.4 C	6.97	47.1 mS/cm

REMARKS : WATER OF GRAYISH BROWN COLOR.
WELL DEVELOPMENT BEGINS AT 8:10 AM AND FINISH AT 9:30 AM
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-4

WELL DEPTH (ft.) :25.0 {1}

WATER LEVEL DEPTH (ft.) : 14.45 {2}

HEIGHT OF WATER (ft.) : 10.55 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 1.733 GALLONS

TYPE OF BAILER = 36"L x 1.5"ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE - NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED
WELL DEVELOPMENT BEGINS AT 8:20 AM AND FINISH AT 9:00 AM.
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE PERFORMED.

DEVELOPED BY : PEDRO J. PEREZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-5

WELL DEPTH (ft.) : 25.0 {1}

WATER LEVEL DEPTH (ft.) : 3.6 {2}

HEIGHT OF WATER (ft.) : 21.4 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 3.548 GALLONS

TYPE OF BAILER = 36"L x 1.5"ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	32.3 C	6.94	24.8 mS/cm
SECOND VOLUME	31.0 C	7.01	27.1 mS/cm
THIRD VOLUME	30.9 C	7.20	24.3 mS/cm
FOURTH VOLUME	31.4 C	7.24	26.9 mS/cm
FIFTH VOLUME	31.8 C	7.31	26.5 mS/cm

REMARKS : WATER OF GRAYISH BROWN COLOR. FOURTH AND FIFTH VOLUMES MORE CLEAR. WELL GOT ALMOST DRY AFTER 3RD VOLUME WAS BAILED-OUT. IT TOOK FROM 10 TO 15 MINUTES TO RECHARGE FOR THE 4TH AND 5TH VOLUMES. WELL DEVELOPMENT BEGINS AT 8:35 AM AND FINISH AT 9:55 AM

DEVELOPED BY : PEDRO J. PEREZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-6

WELL DEPTH (ft.) : 25.0 {1}

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 5.45 {2}

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) :19.55 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 3.218 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	32.1 C	6.99	10.07 mS/cm
SECOND VOLUME	32.1 C	7.00	10.24 mS/cm
THIRD VOLUME	32.1 C	7.04	10.17 mS/cm
FOURTH VOLUME	32.0 C	7.00	10.30 mS/cm
FIFTH VOLUME	32.0 C	7.02	10.22 mS/cm

REMARKS : WATER OF BROWN COLOR WITH SAND; OIL OR BLACK STAINS.
WELL DEVELOPMENT BEGINS AT 10:00 AM AND FINISH AT 10:45 AM
WELL RATE RECHARGE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC. DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-7

WELL DEPTH (ft.) : 25.0 {1} TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 5.81 {2} VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 19.19 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 3.176 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	32.5 C	7.52	3.47 mS/cm
SECOND VOLUME	32.0 C	7.50	3.58 mS/cm
THIRD VOLUME	31.7 C	7.50	3.69 mS/cm
FOURTH VOLUME	31.3 C	7.62	3.69 mS/cm
FIFTH VOLUME	31.3 C	7.68	4.24 mS/cm

REMARKS : WATER OF BROWN COLOR HAVING STRAWS AND SAND. THE BAILER WAS FILLED ONLY 3/4 FOR THE 4TH VOLUME, AND HALF FILLED FOR THE 5TH. THE WELL WAS SET TO REST BY TWO (2) MINUTES AFTER WARD AND THE BAILER CAME FULL. WELL DEVELOPMENT BEGINS AT 11:00 AM AND FINISH AST 11:50 AM.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I   LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.   DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-8

WELL DEPTH (ft.) : 25.0 {1}   TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 8.85 {2}   VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 16.15 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.681 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	33.6 C	7.04	4.38 mS/cm
SECOND VOLUME	33.4 C	7.04	4.27 mS/cm
THIRD VOLUME	33.5 C	7.06	4.06 mS/cm
FOURTH VOLUME	33.4 C	7.05	4.08 mS/cm
FIFTH VOLUME	33.4 C	7.06	4.01 mS/cm

REMARKS : WATER OF GRAY COLOR, SAND AND WITH STRAWS.
WELL DEVELOPMENT BEGINS AT 1:15 PM AND FINISH AT 1:55 PM.
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY: PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC. DATE : SEPTEMBER 14, 1994

BORING/WELL NO. PD-9

WELL DEPTH (ft.) : 71.0 {1} TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 59.57 {2} VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 11.43 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 1.898 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE AND OTHER HYDROCARBON. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 7:55 AM AND FINISH AT 8:40 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY :FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-10

WELL DEPTH (ft.) : 48.0 {1}

WATER LEVEL DEPTH (ft.) : 42.65 {2}

HEIGHT OF WATER (ft.) : 5.35 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 0.866 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED.
WELL DEVELOPMENT BEGINS AT 1:20 PM AND FINISH AT 1:55 PM.
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-11

WELL DEPTH (ft.) :53.0 {1}

WATER LEVEL DEPTH (ft.) : 38.8 {2}

HEIGHT OF WATER (ft.) :14.2 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.351 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 1:15 PM AND FINISH AT 2:15 PM. WELL GETS DRY AT THIRD VOLUME. THREE (3) MINUTES WERE ALLOWED THE WELL TO RECHARGE FOR THE FOURTH VOLUME, THREE (3) MORE TO RECHARGE FOR THE FIFTH.

DEVELOPED BY : RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-12

WELL DEPTH (ft.) : 42.0 {1}

WATER LEVEL DEPTH (ft.) : 25.25 {2}

HEIGHT OF WATER (ft.) : 16.75 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.764 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : WATER, SOME GASOLINE CONTAINS SAND. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 1:30 PM AND FINISH AT 2:25 PM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I   LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.   DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-13

WELL DEPTH (ft.) : 28.0 {1}   TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 11.8 {2}   VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 16.2 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.681 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	31.9 C	7.18	7.38 mS/cm
SECOND VOLUME	31.6 C	7.22	7.40 mS/cm
THIRD VOLUME	31.7 C	7.25	7.40 mS/cm
FOURTH VOLUME	31.7 C	7.33	7.0 mS/cm
FIFTH VOLUME	31.0 C	7.47	7.2 mS/cm

REMARKS : WATERS/SOME GASOLINE AND BLACK STAINS. CONTAIN SOME SAND.
THE DEVELOPMENT BEGINS AT 8:05 AM AND FINISH AT 9:00 AM.
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC. DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-14

WELL DEPTH (ft.) : 43.0 {1} TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 27.7 {2} VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 25.3 {3} = [{1}-{2}]

VOLUME OF WATER : {3] x 0.165 = 4.166 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : WATER/GASOLINE, SOME SAND EACH VOLUME WAS ABOUT 1/3 OF GASOLINE AND 2/3 WATER. WELL DEVELOPMENT BEGINS AT 10:35 AM AND FINISH AT 11:35 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 12, 1994

BORING/WELL NO. PD-15

WELL DEPTH (ft.): 45.0 {1}

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 36.8 {2}

VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) :8.2 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 1.361 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE/SAND. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 10:45 AM AND FINISH AT 11:20 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-16

WELL DEPTH (ft.) : 52.0 {1}

WATER LEVEL DEPTH (ft.) : 40.3 {2}

HEIGHT OF WATER (ft.) : 11.7 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 1.939 GALLONS

TYPE OF BAILER = 36"L X 1.5" ID (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE/SOME WATER AND SAND. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 10:55 AM AND FINISH AT 11:50 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC. DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-17

WELL DEPTH (ft.) : 45.0 {1} TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 31.7 {2} VOLUME OF BAILER = 1.055 lt. = 1,055 cc = 0.275 US gallons

HEIGHT OF WATER (ft.) :13.3 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.166 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE AND SAND. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 2:55 PM AND FINISH AT 3:45 PM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-18

WELL DEPTH (ft.) : 45.0 {1}

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 34.0 {2}

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 11.0 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 1.815 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : FIRST VOLUME ABOUT 9/10 WATER 1/10 GASOLINE AND SAND.
SECOND VOLUME ONE HALF OF WATER, AND ONE HALF OF GASOLINE.
THIRD THRU FIFTH VOLUME-GASOLINE. NO TEMPERATURE, PH OR
CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT
AT 3:00 PM AND FINISH AT 3:50 PM. WELL RECHARGE RATE ALLOWED
CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-19

WELL DEPTH (ft.) : 105.0 {1}

WATER LEVEL DEPTH (ft.) : 80.76 {2}

HEIGHT OF WATER (ft.) : 24.24 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 4.001 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. - 1,055 cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	31.6 C	6.97	19.0 mS/cm
SECOND VOLUME	32.1 C	6.92	19.8 mS/cm
THIRD VOLUME	31.8 C	6.97	20.0 mS/cm
FOURTH VOLUME	31.5 C	6.96	19.9 mS/cm
FIFTH VOLUME	31.4 C	6.96	20.2 mS/cm

REMARKS : WATER. WELL DEVELOPMENT BEGINS AT 2:15 PM AND FINISH AT 4:00 PM
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ & FRANK CAMACHO

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 14, 1994

BORING/WELL NO. PD-20

WELL DEPTH (ft.) : 105.0 {1}

WATER LEVEL DEPTH (ft.) : 85.1 {2}

HEIGHT OF WATER (ft.) :19.9 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 3.300 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE MIXED WITH BLACK HYDROCARBON. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 9:30 AM AND FINISH AT 11:30 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ & RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 19, 1994

BORING/WELL NO. PD-21

WELL DEPTH (ft.) : 140.0 {1}

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 94.0 {2}

VOLUME OF BAILER = 1.055 lt. - 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 46.0 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 7.590 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	32.0 C	6.92	8.07 mS/cm
SECOND VOLUME	32.5 C	6.65	12.88 mS/cm
THIRD VOLUME	32.9 C	6.63	13.58 mS/cm
FOURTH VOLUME	32.2 C	6.62	13.73 mS/cm
FIFTH VOLUME	31.6 C	6.58	13.91 mS/cm

REMARKS : WATER WITH HIGH TURBIDITY. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : RAFAEL RUIZ & PEDRO RODRIGUEZ

SUPERVISED BY : PEDRO J. PEREZ

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

V I C T O R   E.   R I V E R A   A S S O C I A T E S
G E O T E C H N I C A L   E N G I N E E R S

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 16, 1994

BORING/WELL NO. PD-22

WELL DEPTH (ft.) : 190.0 {1}

TYPE OF BAILER = 48"L x 0.75 I.D. (PVC)

WATER LEVEL DEPTH (ft.) : 159.5 {2}

VOLUME OF BAILER = 0.141 US gallons

HEIGHT OF WATER (ft.) : 30.5 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 5.033 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	33.4 C	7.27	6.73
SECOND VOLUME	31.1 C	7.34	6.74
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : 1.5" I.D. BAILER GOT STOCK AT A DEPTH OF 158'- 6". A 3/4" I.D. BAILER REACHED A DEPTH OF 174' 6". WATER LEVEL REACH A DEPTH OF 159'-6". JUST ONE GALLON WAS BAILED OUT. BAILING LAST 50 MINUTES. ON SEPTEMBER 26, JUST TWO (2) VOLUMES WERE BAILED-OUT. FIRST VOLUME LAST 2 HOURS 40 MINUTES. SECOND VOLUME LAST 2 HOURS 35 MINUTES.

DEVELOPED BY : RAFAEL RUIZ & PEDRO RODRIGUEZ

SUPERVISED BY : PEDRO J. PEREZ

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC. DATE : SEPTEMBER 14, 1994

BORING/WELL NO. PD-23

WELL DEPTH (ft.) : 104.0 {1} TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 92.5 {2} VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 11.5 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 1.898 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE WITH HYDROCARBON. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 8:10 AM AND FINISH AT 9:10 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ & RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 16, 1994

BORING/WELL NO. PD-24

WELL DEPTH (ft.): 147.0 {1}

WATER LEVEL DEPTH (ft.) : 98.6 {2}

HEIGHT OF WATER (ft.) : 48.46 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 8.003 GALLONS

TYPE OF BAILER = 36" x 1.5" ID (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME	31.4 C	7.27	13.71 mS/cm
SECOND VOLUME	31.3 C	7.02	16.47 mS/cm
THIRD VOLUME	31.1 C	6.50	16.37 mS/cm
FOURTH VOLUME	31.2 C	6.47	16.24 mS/cm
FIFTH VOLUME	31.4 C	6.51	15.93 mS/cm

REMARKS : WATER/SOME HYDROCARBON. WELL DEVELOPMENT BEGINS AT 8:10 AM AND FINISH AT 9:10 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : RAFAEL RUIZ & PEDRO RODRIGUEZ

SUPERVISED BY : PEDRO J. PEREZ

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

V I C T O R   E.   R I V E R A   A S S O C I A T E S
G E O T E C H N I C A L   E N G I N E E R S

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 14, 1994

BORING/WELL NO. PD-25

WELL DEPTH (ft.) : 160.0 {1}

WATER LEVEL DEPTH (ft.) : 146.0 {2}

HEIGHT OF WATER (ft.) : 14.0 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.310 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE/WATER/SOME OTHER HYDROCARBON.
FIFTH VOLUME HAS MORE WATER THAN GASOLINE OR PROBABLE DIESEL FUEL. WELL DEVELOPMENT BEGINS AT 2:05 PM AND FINISH AT 3:50 PM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ & FRANK CAMACHO

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC. DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-26

WELL DEPTH (ft.) : 180.0 {1} TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 168.7 {2} VOLUME OF BAILER = 1.055 lt. = 1,055cc = 0.275 US gallons

HEIGHT OF WATER (ft.) : 11.3 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 856 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE, NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED.
WELL DEVELOPMENT BEGINS AT 3:00 PM AND FINISH AT 4:10 PM
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ & RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 14, 1994

BORING/WELL NO. PD-27

WELL DEPTH (ft.) : 135.0 {1}

WATER LEVEL DEPTH (ft.) : 130.45 {2}

HEIGHT OF WATER (ft.) : 45.5 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 0.745 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE WITH HYDROCARBON. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 2:20 PM AND FINISH AT 3:30 PM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ & RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 13, 1994

BORING/WELL NO. PD-28

WELL DEPTH (ft.) : 100.0 {1}

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 83.6 {2}

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 16.4 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.723 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED.
WELL DEVELOMPMENT BEGINS AT 3:30 PM AND FINISH AT 4:45 PM
WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-29

WELL DEPTH (ft.) : 135.0 {1}

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 107.9 {2}

VOLUME OF BAILER = 1.055 lt. = 1,055cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) : 27.1 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 4.455 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : WATER WITH HYDROCARBON. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 8:15 AM AND FINISH AT 10:30 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ & RAFAEL RUIZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 14, 1994

BORING/WELL NO. PD-30

WELL DEPTH (ft.) : 107.0 {1}

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 78.95 {2}

VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) :28.05 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 4.70 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE WITH WATER. NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. WELL DEVELOPMENT BEGINS AT 10:30 AM AND FINISH AT 12:15 AM. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO RODRIGUEZ & FRANK CAMACHO

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC. DATE : SEPTEMBER 14, 1994

BORING/WELL NO. PD-31

WELL DEPTH (ft.) :117.0 {1} TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

WATER LEVEL DEPTH (ft.) : 103.15 {2} VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

HEIGHT OF WATER (ft.) :13.85 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.269 GALLONS

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE, NO TEMPERATURE, PH OR CONDUCTIVITY TESTS ATTEMPTED. AFTER THE THIRD BAILER SECURED TO COMPLY WITH THE FIRST VOLUME, WELL DRIED-UP. EVERY FIVE (5) MINUTES 1/2 BAILER WAS SECURED. FIRST VOLUME COMPLETED AT 10:28 AM. AT 1:40 PM THE WELL WAS CHECKED AND WAS DRY. ON SEPT. 15, 1994 AT 11:00 AM WAS CHECKED AGAIN. IT WAS STILL DRY. ON SEPT. 16 AND SEPT. 21, 1994. THE WELL WAS CHECKED AND CONTINUES DRY.

DEVELOPED BY : PEDRO RODRIGUEZ

SUPERVISED BY : FRANK CAMACHO

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

V I C T O R E. R I V E R A A S S O C I A T E S
G E O T E C H N I C A L E N G I N E E R S

--- DEVELOPMENT OF GROUND WATER MONITORING WELLS ---

PROJECT : CORCO SITE PHASE I

LOCATION : PENUELAS, PUERTO RICO

CLIENT : DSM ENVIRONMENTAL SERVICES, INC.

DATE : SEPTEMBER 15, 1994

BORING/WELL NO. PD-32

WELL DEPTH (ft.) :175.0 {1}

WATER LEVEL DEPTH (ft.) : 161.8 {2}

HEIGHT OF WATER (ft.) :13.2 {3} = [{1}-{2}]

VOLUME OF WATER : {3} x 0.165 = 2.186 GALLONS

TYPE OF BAILER = 36"L x 1.5" ID. (TEFLON)

VOLUME OF BAILER = 1.055 lt. = 1,055 cc
= 0.275 US gallons

FIELD TEST ->	TEMPERATURE	PH	CONDUCTIVITY
FIRST VOLUME			
SECOND VOLUME			
THIRD VOLUME			
FOURTH VOLUME			
FIFTH VOLUME			

REMARKS : GASOLINE WITH BLACK HYDROCARBON. NO TEMPERATURES, PH OR CONDUCTIVITY TESTS ATTEMPTED.

WELL DEVELOPMENT BEGINS AT 11:30 AND FINISH AT 12:00 M

THE DEVELOPMENT CONTINUE AT 1:00 PM TO 2:00 PM BECAUSE OF LUNCH BREAK. WELL RECHARGE RATE ALLOWED CONTINUOUS BAILING BE CONDUCTED.

DEVELOPED BY : PEDRO J. PEREZ & RAFAEL RUIZ

SUPERVISED BY : PEDRO J. PEREZ

CHECKED AND APPROVED BY : JOSE R. RIVERA NAZARIO, P.E.

September 27, 1994

DSM ENVIRONMENTAL SERVICES, INC.
1830 S. Kirkwood, Suite 201-A
Houston, Texas USA 77077

Attn: Mr. Tod C. Heverly
Chief Geologist

Re: Wells Development Program
CORCO Petrochemical Complex
Peñuelas, Puerto Rico

Gentlemen:

Attached table I list depths below the top of the corresponding riser hydrocarbon (if any) and of the water were recorded at each monitored well. Also indicated is the time the monitoring was performed.

All measurements were performed by means of the oil/water interface probes provided by yourgoodselves attached to a graduated tape.

Cordially yours,

VICTOR E. RIVERA ROLDAN INGENIERO LICENCIADO LIC. # 5008 EXPIRA 12 AGO. 98 PUERTO RICO

VICTOR E. RIVERA ROLDAN, P.E.

Associate

VERR/vmr

VICTOR E. RIVERA ASSOCIATES
GEOTECHNICAL ENGINEERS
& CONCRETE TESTING LABORATORIES

Ponce By Pass, Km. 225.8 • Box 198, Station No. 6 • Ponce, Puerto Rico 00732 • (809) 843-6538 / 840-1340 / 840-1341 • Fax (809) 259-1604

Table I:
Depth of Top Surface of the Hydrocarbon
and/or Water as Referred to
The Top of Well Riser
Wells Development Program
CORCO Petrochemical Complex
Peñuelas, Puerto Rico

Well No.	Time	Hydrocarbon (1)	Water (2)	Hydrocarbon Thickness (1)-(2)=(3)
PD 1	11:38A	---	5.36	none
2	10:48A	none	9.91	none
3	10:44A	none	7.94	none
4	10:37A	none	19.09	none
5	10:29A	none	5.63	none
6	10:24A	none	5.21	none
7	10:10A	none	5.65	none
8	10:05A	none	9.18	none
9	8:17A	52.39	62.10	9.71
10	9:39A	34.94	45.17	10.23
11	8:31A	31.12	41.44	10.32
12	8:45A	none	27.40	none
13	8:50A	none	14.72	none
14	8:57A	29.99	30.64	0.65
15	9:08A	28.22	37.30	9.08
16	9:23A	35.22	42.82	7.60
17	9:29A	30.23	33.69	3.46
18	9:59A	none	36.85	none
19	9:13A	none	83.07	none
20	9:19A	85.77	77.43	8.34
21	10:29A	none	96.59	none
22	9:57A	none	162.32	none
23	8:15A	85.59	94.94	9.35
24	9:04A	none	101.35	none
25	8:55A	139.51	148.71	9.20

VICTOR E. RIVERA ROLDAN
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12 AGO. 98
PUERTO RICO

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Well No.	Time	Hydrocarbon (1)	Water (2)	Hydrocarbon Thickness (1)-(2)=(3)
26	8:40A	159.12	169.27	10.15
27	9:41A	124.65	133.78	9.13
28	9:32A	78.09	86.05	7.96
29	9:50A	none	109.57	none
30	8:22A	none	81.10	none
31	8:29A	none	115.83	none
32	8:35A	154.15	164.07	9.92
EL-1	12:25P	none	10.07	none
EL-2	12:15P	none	16.26	none
EL-3	12:20P	none	9.21	none
EL-4	---	none	11.61	none
WL-1	11:49A	8.84	9.46	0.62
WL-2	11:45A	none	9.37	none
WL-3	11:49A	none	6.71	none
WL-4	12:15P	none	5.19	none
MW-1	11:27P	no hydrocarbon or water recorded within the surfacemost 200.0 ft. Reportly, Well is 300.0 ft. deep.		
MW-2	10:48A	none	177.39	none
MW-3	10:40A	169.42	178.05	8.63
MW-4	10:55A	166.96	173.92	6.96
MW-5	11:02A	162.52	172.72	10.20
MW-6	11:14A	165.58	173.56	7.98

VICTOR E. RIVERA ROLDAN
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PUERTO RICO

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PUERTO RICAN OIL LABORATORY

INSPECTION DATA OF PETROLEUM FUELS

LABORATORY ANALYSIS

FAX(809)836-1869 TEL.(809)843-3030 EXT. 233

PROLAB

DATE: 08/17/94

PRODUCT: HYDROCARBONS
SOURCE: WELLS
ORIGINATOR : CORCO

WELL NO.	PD-4	PD-9	PD-10	PD-11	PD-14	PD-15	PD-16	PD-17	PD-18
SAMPLE DATE	5/18/94	5/25/94	5/26/94	5/31/94	6/2/94	6/8/94	6/9/94	6/9/94	6/10/94
DISTILLATION									
IBP	310	220	196	140	166	204	110	128	100
5%	370	246	236	194	196	238	136	156	114
10%	420	260	246	212	200	248	146	170	120
20%	458	276	268	242	210	264	160	186	124
30%	478	284	280	266	216	274	176	202	130
40%	496	306	292	286	230	282	194	222	136
50%	514	324	304	306	254	292	212	246	146
60%	530	352	324	326	272	302	238	266	158
70%	550	392	360	368	286	320	264	280	178
80%	578	464	444	456	296	394	284	296	216
90%	622	558	538	560	350	518	300	328	278
95%	670	622	638	640	466	622	334	412	308
E.P.	690	642	640	676	546	625	438	572	414
REC.									
RES.									
LOSS									
R.V.P	0.0	0.5	1.2	2.8	2.1	1.0	5.6	3.9	9.7
API GRAV. @ 60 °F	32.7	39.0	37.9	40.9	34.1	36.0	56.5	50.3	71.6
SULFUR,WT.%	0.33	0.34	0.24	0.33	0.08	0.13	0.001	0.02	0.001
AROMATICS,VOL.%	32.3	46.3	56.6	47.0	82.1	66.6	37.1	45.2	15.6
BENZENE,WT.%	N/A	N/A	N/A	3.10	34.70	N/A	5.16	2.34	2.10

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CHEMIST

PROLAB

PUERTO RICAN OIL LABORATORY

INSPECTION DATA OF PETROLEUM FUELS

LABORATORY ANALYSIS

FAX(809)836-1869 TEL.(809)843-3030 EXT. 233

DATE: 07/08/94

PRODUCT: HYDROCARBONS
SOURCE: WELLS
ORIGINATOR : CORCO

WELL NO.	PD-20		PD-32						
SAMPLE DATE	7/1/94		7/7/94						
DISTILLATION									
IBP	178		174						
5%	212		214						
10%	224		226						
20%	238		240						
30%	254		254						
40%	266		262						
50%	276		294						
60%	284		290						
70%	294		304						
80%	318		324						
90%	440		424						
95%	540		520						
E.P.	590		590						
REC.									
RES.									
LOSS									
R.V.P	1.3		1.7						
API GRAV. @ 60 °F	40.4		42.8						
SULFUR WT.%	0.10		0.10						
HEATING VALUE GROSS,BTU/LB.	19759.4		19870.6						

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CHEMIST

PROLAB

PUERTO RICAN OIL LABORATORY

INSPECTION DATA OF PETROLEUM FUELS

LABORATORY ANALYSIS

FAX(809)836-1859 TEL.(809)843-3030 EXT. 233

DATE: 08/09/94

PRODUCT: HYDROCARBONS
SOURCE: WELLS
ORIGINATOR : CORCO

WELL NO.	PD-25	PD-27	PD-28	PD-29	PD-26				
SAMPLE DATE	7/8/94	7/21/94	7/14/94	7/21/94	7/13/94				
DISTILLATION									
IBP	220	120	100	100	230				
5%	240	156	120	120	256				
10%	250	174	128	128	270				
20%	268	198	140	138	288				
30%	286	216	154	150	308				
40%	308	240	172	162	330				
50%	328	256	196	182	378				
60%	366	270	224	210	430				
70%	428	282	250	252	480				
80%	494	292	274	274	530				
90%	614	316	296	280	660				
95%	670	410	320	286	708				
E.P.		486	398	332	710				
REC.									
RES.									
LOSS									
R.V.P	6.0	3.4	8.0	8.1	0.7				
API GRAV. @ 60 °F	40.2	44.8	58.7	60.8	35.9				
SULFUR,WT.%	0.37	0.01	0.02	0.001	0.51				
AROMATICS,VOL.%									
BENZENE,WT.%									

CERTIFIED BY *[signature]*
CHEMIST